EAST NEWTON NORTH

NEIGHBOURHOOD CONCEPT PLAN

CITY OF SURREY

PLANNING & DEVELOPMENT DEPARTMENT

SURREY
CITY OF PARKS

EAST NEWTON NORTH

NEIGHBOURHOOD CONCEPT PLAN

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SURREY
CITY OF PARKS

Corporate Report

MANAGEMENT DEPT.

NO: C 318

COUNCIL DATE: JUL 2 3 1996

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**July 16, 1996**
FROM:	**General Manager, Planning & Development**	FILE:	**2350-003/1**
SUBJECT:	**East Newton (North Neighbourhood No. 1) Neighbourhood Concept Plan (NCP) Stage 2 Final Report**		

RECOMMENDATION

The Planning & Development Department recommends that Council:

1. Approve the final and complete East Newton North Neighbourhood Concept Plan (NCP) (Appendix I).

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

3. Amend the East Newton Local Area Plan to reflect the recommendations contained in the East Newton North Neighbourhood Concept Plan and to redesignate a portion of Area D from Suburban to Urban.

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

   (1) To adopt the East Newton North Neighbourhood Concept Plan (NCP), by an amendment to the Official Community Plan By-law 1996, No. 12900 or by a new Official Community Plan By-law, including the redesignation of a portion of Area D from Suburban to Urban as shown in Appendix II.

   (2) An amendment to Zoning By-law, 1993, No. 12000, to enact the approved bonus density provision for the East Newton North Neighbourhood NCP area; and

   (3) An amendment to the City of Surrey Land Use and Development Applications Fees Imposition By-law, 1993, No. 11631 as amended to

require the payment of additional application fees to recover the costs of preparing the Neighbourhood Concept Plan.

INTENT

The intent of this report is:

1. To provide an overview of the complete and final Neighbourhood Concept Plan for the East Newton North Neighbourhood, including a summary of the planning process and methods of implementing the Neighbourhood Concept Plan.

2. To provide the background and recommendations on the amenity and financial proposals (Stage 2) of the Neighbourhood Concept Plan.

3. To outline the by-laws necessary for implementing the approved East Newton Neighbourhood Concept Plan for the north neighbourhood.

BACKGROUND

In March, 1993, City Council approved a Local Area Plan for East Newton. The approved plan identifies two residential neighbourhoods (north and south neighbourhoods) and a business park east of 152 Street. The East Newton Local Area Plan identified general land uses and development policies for the area. A copy of the generalized Land Use Plan showing the boundaries of the two residential neighbourhoods and the business park area is attached in Appendix III.

In June, 1993, City Council approved the Neighbourhood Concept Plan (NCP) approach to implementing Local Area Plans. In July, 1995, City Council approved the physical plan component (Stage I) of the East Newton North Neighbourhood Concept Plan and authorized the NCP participants to commence Stage 2 of the NCP based on the type, size, location and densities of the specific 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 IV.

DISCUSSION

Overview of the Stage 1 Neighbourhood Concept Plan (Physical Component)

1. Development Summary

Within the approximately 330-acre NCP area there are 217 separate parcels owned by approximately 197 different owners.

The Neighbourhood Concept Plan responds to the objectives outlined in the Local Area Plan (LAP) such as a variety of housing types, protection of the Bear Creek natural environment, a school/park site as the neighbourhood focus and a road and walkway system that provides safe and easy movement through the neighbourhood.

The plan provides a variety of lot sizes and housing types from low to medium densities, and consistent with the LAP, the area is predominantly urban single family residential with a component of compact cluster housing in the form of small lots surrounding the neighbourhood park/school site. A medium density residential area in the form of townhouses is located on the south western edge of the neighbourhood. The plan provides for approximately 1,458 dwelling units and a projected population of approximately 4,369.

2. Resolution of Outstanding Issues

During the preparation of the Stage 1 NCP, the following issues arose and have been resolved through consultation with owners, city staff, and the Steering Committee.

(a) Double Fronting Lots on 72 Avenue

In the Stage I document, the NCP proposed six double fronting lots along 72 Avenue east of 148 Street. However, double fronting lots are contrary to Surrey's Official Community Plan which specifies that all lots adjacent to a major arterial such as 72 Avenue must be serviced by a lane or frontage road. As indicated in the plan, the double fronting lots have now been eliminated, and instead, a lane is provided to the rear of these affected lots which front 72 Avenue.

(b) Proposed Revision to Density Adjacent to Chimney Hill

The East Newton Local Area Plan indicated that in order to protect the existing established suburban residential neighbourhood of Chimney Hill, the boundary of the suburban residential area is to be expanded westward into the eastern portion (Area D) of the NCP by providing two rows of half acre lots.

Area D is the area of the NCP adjacent to the western boundary of Chimney Hill, extending west to 148 Street and from 72 Avenue to the northern boundary of the NCP area, north of 76 Avenue.

The NCP has provided an alternate approach which is to provide a six metre landscaped buffer between the suburban lots of Chimney Hill and the urban lots of the NCP. The buffer will be accommodated by a row of 11,500 square foot lots along the eastern boundary of the NCP with a minimum lot depth of 34 metres. The 11,500 square foot lots will include the 6 metre protected area at the rear of the lots and will be protected by a restrictive covenant.

An Open House meeting organized by the Steering Committee was held in February, 1996 to review the suburban to urban transition area with the Area D owners and the owners of the Chimney Hill properties adjacent to the transition area. Notices were sent to affected owners by mail and the Steering Committee members and planning staff were available to answer

any questions. Display panels depicting aerial and cross-section views of the existing vegetation and the proposed transition area were provided to accurately inform the owners of what is planned for this area. Comment sheets were distributed to the participants and approximately 80% of the respondents answered positively to the proposal by Area D owners to seek an easterly expansion of the urban designation to accommodate large urban lots and a buffer.

(c) Northern Portion of Area D, North of 76 Avenue

The most northerly portion of Area D (north of 76 Avenue) is envisioned to be a combined urban and suburban community with an appropriate gradation of residential density toward the edge of the area bordering agricultural land (Guildford Golf Course). Accordingly, the 11,500 square foot lots of Area D south of 76 Avenue are to extend north of 76 Avenue along the north east portion of the NCP area, as indicated in the Stage I Neighbourhood Concept Plan.

Some owners in this northerly portion submitted a proposal to the Planning & Development Department in June 1996. The proposal constituted approximately 21 (8,000 square feet) lots for the west and north perimeter of the area in question and approximately 33 smaller (6,200 square feet) lots to the south, either accessed by 76 Avenue or by an internal cul-de-sac (Appendix V).

As their proposal deviates significantly from the transitional concept outlined in the Stage I NCP, the Planning & Development Department suggested another proposal to the owners whereby the suburban transition would be maintained by locating 11,500 square foot lots throughout the area in question and maintaining the road layout as indicated in Stage I of the East Newton North NCP except for a strip of smaller sized lots that would front 76 Avenue up to the cul-de-sac entrance (Appendix VI). It is noted that at the June 24, 1996 Regular Council Meeting, Council dealt with the above-noted owners' request to appear before Council to express their concerns with respect to the area in question by recommending that the owners bring their concerns forward at the Public Hearing for the Neighbourhood Concept Plan Stage II.

(d) Environmental Considerations

An environmental overview, bio-inventory and raptor survey were undertaken in conjunction with this NCP. Of particular importance is the protection of Bear Creek and its tributary. The NCP respects the environmental setbacks recommended by the environmental consultant. Envirowest, and the Ministry of Environment, Lands and Parks (MELP) which is a 15-metre setback from the top of the Bear Creek bank, or from the 100 year flood level of Bear Creek, where the top of bank is not clearly defined. As well, a 15-metre setback from the top of the bank for the north/south tributary of Bear Creek has been proposed.

Final approval of all servicing and creek protection measures from the Ministry of Environment have been obtained.

(e) Pet Cemetery

There is an existing pet cemetery located within the NCP area at 78 Avenue and 147 Street. Some members of the public had expressed a desire that the cemetery remain on the property in perpetuity. At the July 10, 1995 Regular Council meeting, Council passed a motion asking the Parks & Recreation Department to investigate the possibility of Surrey or the SPCA owning a Pet Cemetery that can eventually become a park. The Parks & Recreation Department recommended, in its report to Council, that Council not accept the Pet Cemetery lands as park land. However, Council did support, in principle, the formation of a non-profit society to acquire the Pet Cemetery lands with the understanding that the site would be jointly administered by the society and the SPCA. Therefore, the owner of the parcel of land containing the existing pet cemetery will need to initiate the formation of a non-profit society to acquire the Pet Cemetery or, as the parcel is designated for residential single family lots in the NCP, the owner will need to remove the cemetery upon developing the site.

Overview of Stage 2 Neighbourhood Concept Plan (Engineering, Financing and Amenities)

1. Components of the Stage 2 Neighbourhood Concept Plan

The Stage 2 NCP contains an evaluation of the engineering services required for this neighbourhood, an NCP infrastructure financing and funding proposal, development phasing, and amenity/facility contribution proposals. A more detailed review and staff's recommendations regarding the engineering and infrastructure financing components of the Stage 2 NCP are contained in a report from the General Manager of Engineering, which is to be considered by City Council concurrently with this report.

2. Neighbourhood amenity/Facility Requirements and Funding

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

The amenity funding proposals are based upon a recent review of NCP amenities requirements by the involved departments as well as estimates of park development costs prepared by the Parks & Recreation Department. The funding arrangements are as follows:

(a) *Parkland Development*

A 13.1 acre site is proposed which accommodates a 5.4 acre park and a 7.7 acre school site. Acquisition of the property is currently being undertaken through a 9.9 acre land exchange between the current owner of the proposed school site and the School Board/Parks and Recreation Department with the balance of the land contributed through the current owner's 5% parkland dedication. It is estimated that the development of the joint school/park site will cost approximately $652,600 which corresponds to a per unit cost of $526.00.

There is also a linear park strip, east of 148 Street which will be acquired by the City as part of the 5% park dedication during the subdivision/rezoning process.

(b) *Library Materials, Police and Fire Protection*

The NCP proposes contributions to the capital costs associated with library materials, police and fire protection in this NCP area as $112.50, $50.00, and $216.00 respectively.

(c) *Total Contributions*

The total contribution toward the capital costs of amenities/facilities for this NCP area is proposed to be $1,122,484 which corresponds to a per dwelling unit contribution of approximately $904.50.

Property Owner and Public Consultation

There was extensive consultation with the property owners throughout the NCP process, including 4 Public Open House meetings and 5 workshops for the 5 sub-areas of the NCP. The last Public meeting was held on June 12, 1996. The majority of owners support the NCP as proposed.

Implementation of the Neighbourhood Concept Plan

1. Amendment to Surrey's Official Community Plan

Surrey's proposed new Official Community Plan requires that the land use component of the Neighbourhood Concept Plan be adopted as part of the OCP and that a public hearing for its inclusion be held prior to final adoption. Alternatively, the NCP may be adopted by a separate Official Community Plan By-law. In either case, a by-law is needed to include the physical plan and land use summary of the NCP, and will be introduced in the near future.

2. Amendment to Surrey's Zoning By-law

In accordance with Council's approved Zoning By-law approach to implement the provision of amenities in NCP areas (pursuant to Sections 963.1 and 378 of the

Municipal Act), the Zoning By-law must be amended to accommodate bonus densities in exchange for the specified amenities identified for this NCP area. The Zoning By-law amendment will be introduced in due course.

3. Recovery of NCP Preparation Costs

The costs of preparing this NCP were borne by Genstar Development Company, the lead developer in the NCP area. Genstar Development Company has agreed to cover 50% of the preparation costs and the remaining 50% is to be recovered by the City of Surrey, through the collection of additional application fees, and rebated to Genstar as monies are received from future rezoning applications. The total consultant cost to complete the NCP was $231,880. Under the formula proposed in the Stage 1 report, Genstar Development Corporation agreed to pick up half this cost. The cost to be shared by the other owners becomes:

$$\frac{\$231,880}{2} = \$115,940$$

The costs become $515.29 per acre or $133.15 per unit. An amendment to the Surrey Land Use and Development Application Fees Imposition By-law will be needed to incorporate the per unit NCP preparation cost. Following the enactment of the amended fee by-law for this NCP area. 50% of the total cost will be repaid to Genstar as monies are received from the future rezoning applications.

4. Development Applications

There are several in-stream development applications in this NCP area which will be evaluated in the context of the approved NCP. If in conformance with the plan, these applications will be submitted to Council for consideration and the processing times for these applications will be substantially decreased as they will be within an approved NCP.

CONCLUSION

The East Newton North Neighbourhood Concept Plan is the result of an all encompassing analysis of the development and financial requirements for this future urban neighborhood. The Neighbourhood Concept Plan makes plausible recommendations for developer contributions and financial assistance in providing services and amenities. The NCP illustrates land uses, densities, and a development pattern that can be supported within the City's financial capabilities.

The NCP has involved significant input from the affected property owners, the public, the various City Departments and interested outside agencies, and represents a sensible development plan prepared within this partnership framework.

Lehman O. Walker
General Manager
Planning & Development Department

JC/ln

Appendices

Appendix I:	East Newton North Neighbourhood Concept Plan for the North Neighbourhood (Stage II Final NCP)
Appendix II	Redesignation of a Portion of Area D from Suburban to Urban Map
Appendix III	East Newton Local Area Plan
Appendix IV	Stage I Land Use and Subdivision Concept
Appendix V	North Portion of Area D: Owner's Proposal
Appendix VI	Planning & Development Department's Proposal to North Portion of Area D Owners

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OCP REDESIGNATION AREA - SUBURBAN TO URBAN

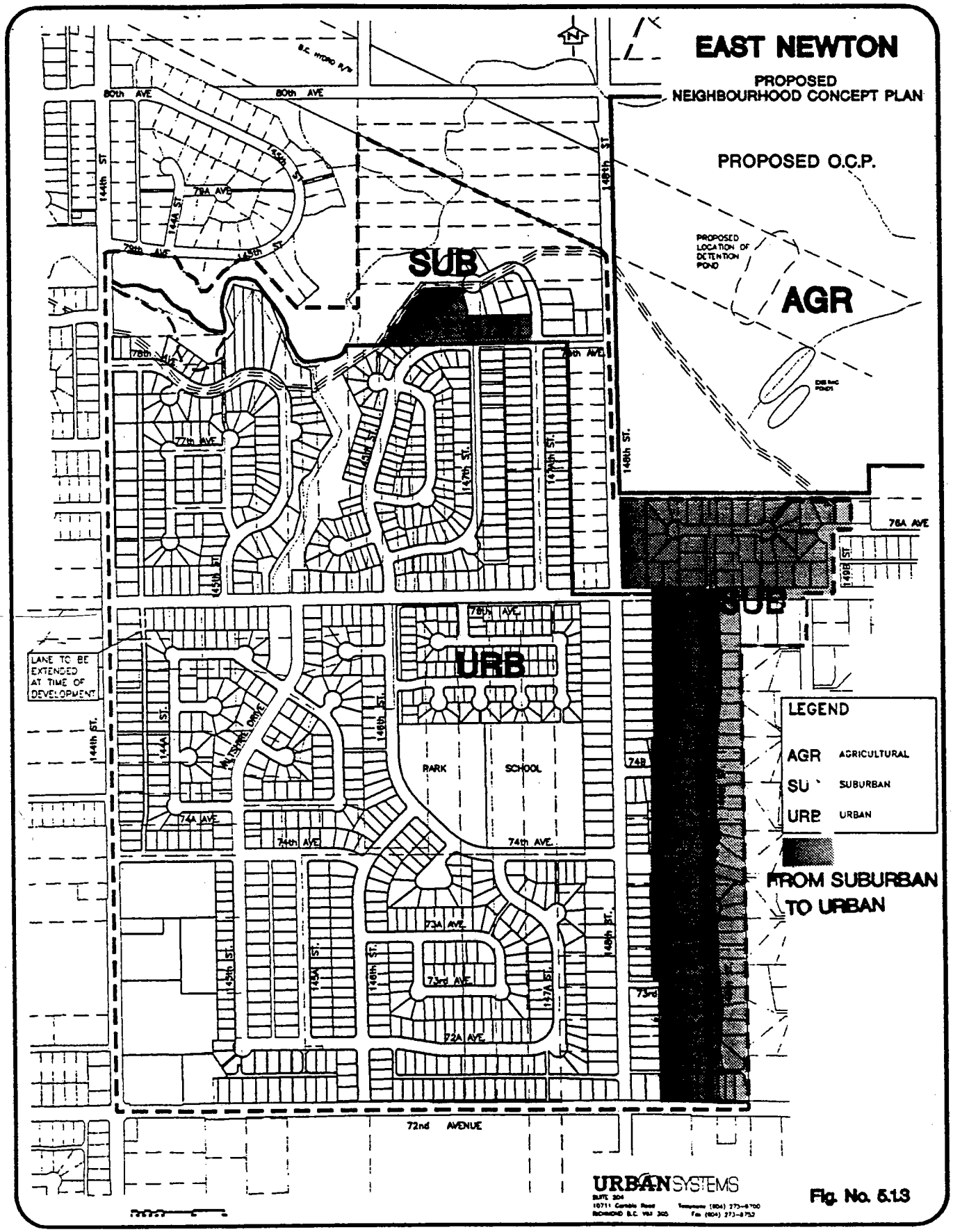
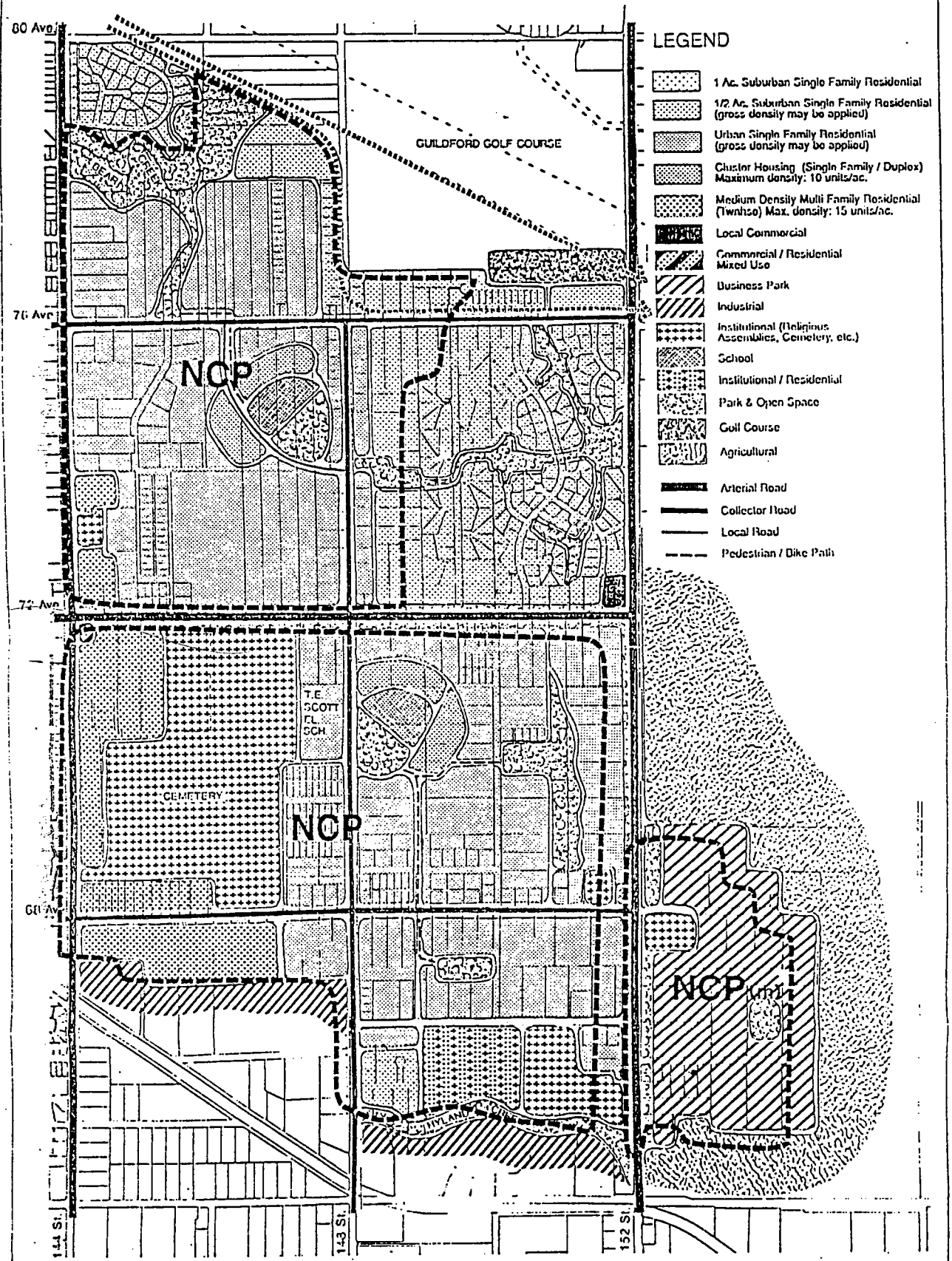


Fig. No. 5.13

LAND USE PLAN

APPENDIX III

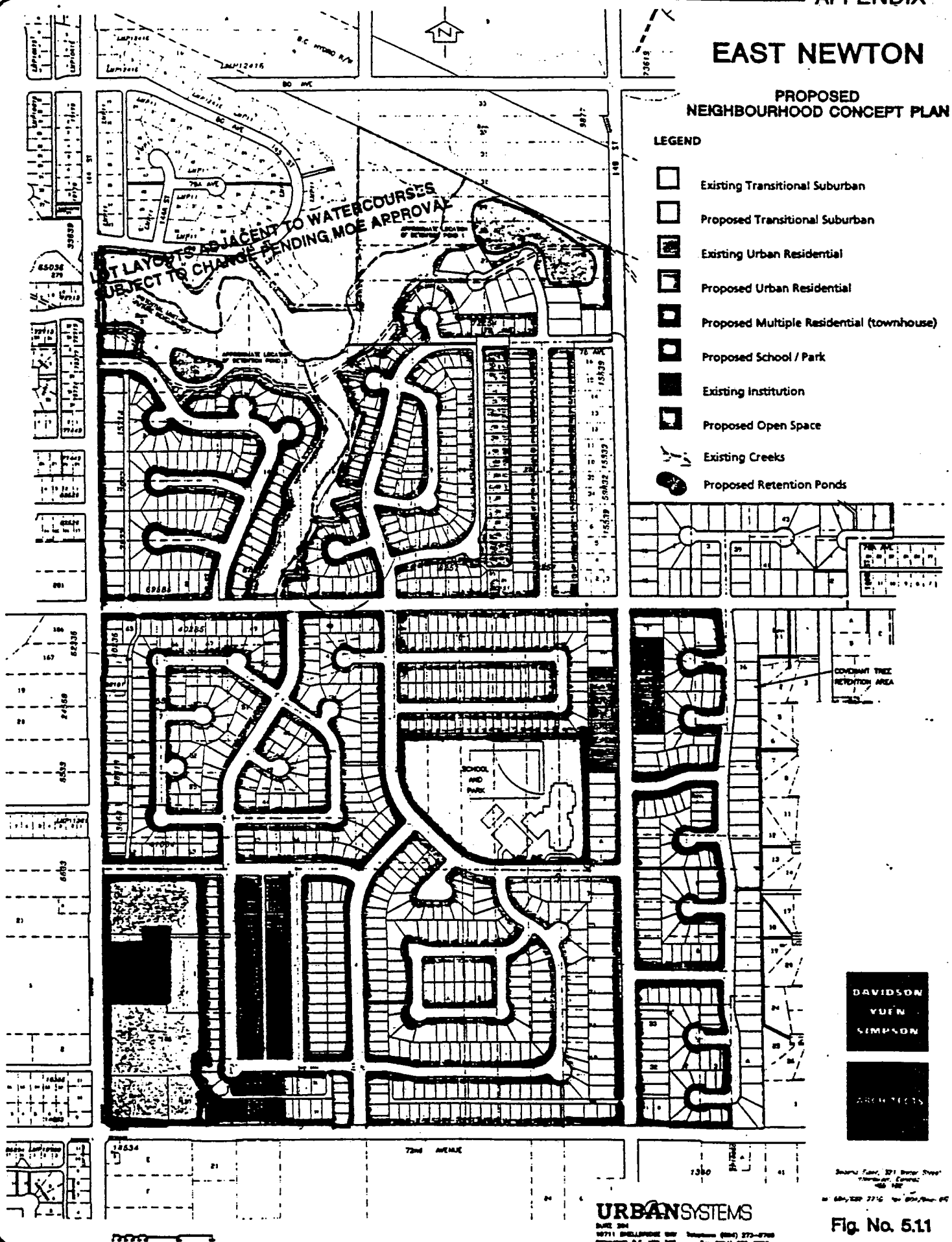


MAP 5

84

EAST NEWTON

PROPOSED NEIGHBOURHOOD CONCEPT PLAN



DAVIDSON YUEN SIMPSON ARCHITECTS

URBAN SYSTEMS

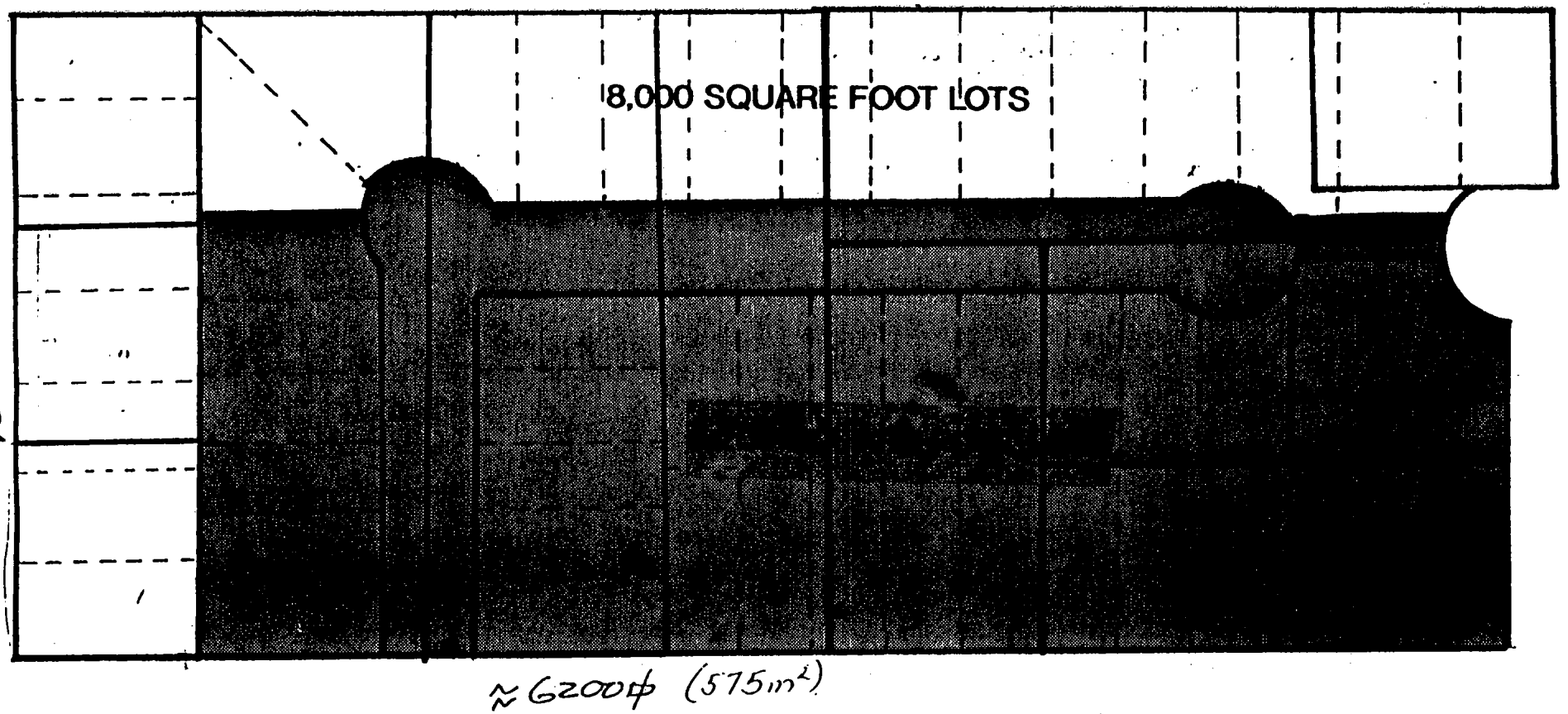
Fig. No. 5.1.1

Proposed layout by Property Owners

---- Proposed

——— Existing

≈8000 ft (743 m²)



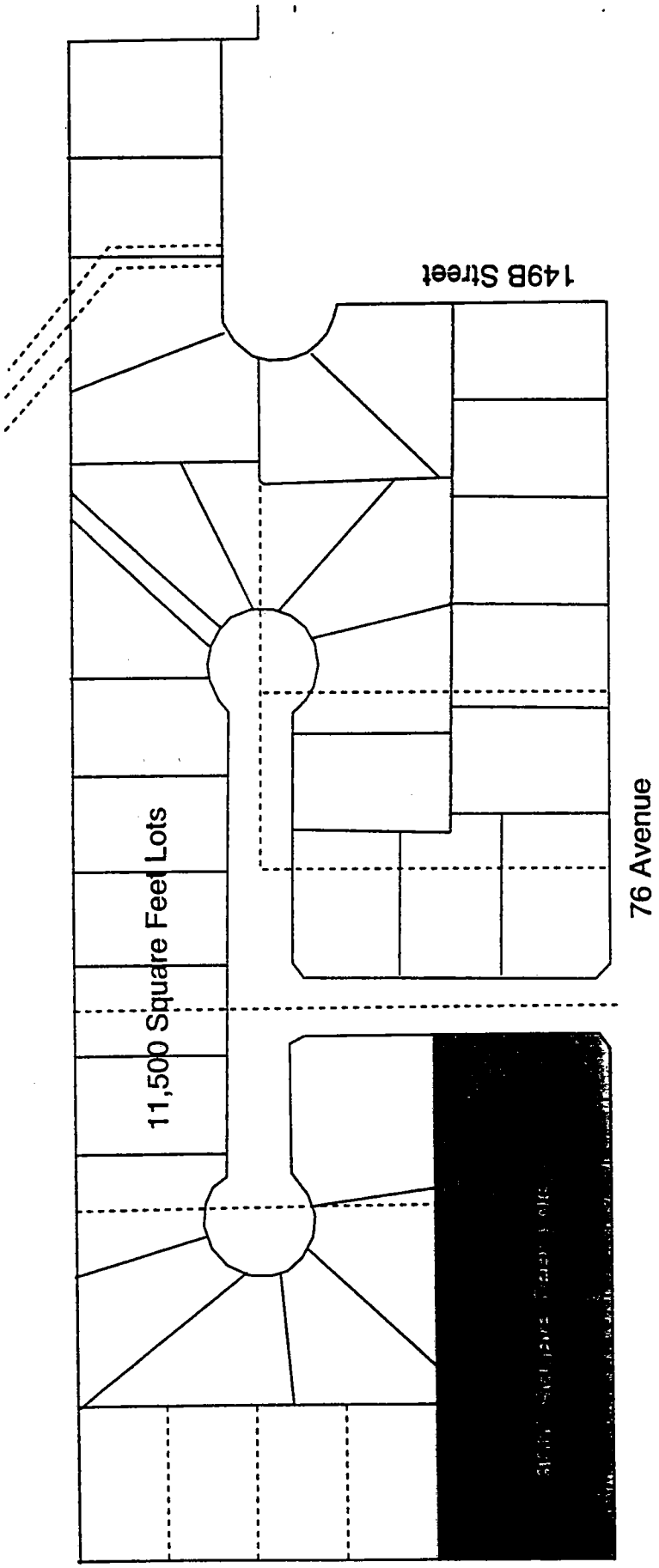
98

≈6200 ft (575 m²)

76th Avenue

Map 5

APPENDIX V


149B Street
76 Avenue
11,500 Square Feet Lots

EAST NEWTON NCP
STEERING COMMITTEE

East Newton Neighbourhood Concept Plan

Final Report

URBAN SYSTEMS

June 1996
6133409.2
960320.rpt

CONTENTS

FIGURES

FIGURES (cont'd)

APPENDICES

1. Introduction

1.1 Process Overview

The NCP1 for East Newton north has been developed in two stages. The purpose of Stage I of the Neighbourhood Concept Plan (NCP) was to achieve approval in principle of the physical plan for the study area. The document provided background information, determined land use and densities, identified land for school, parks and open space, defined road hierarchy, local road locations and provided servicing concepts.

The Stage I NCP document was presented to Council in June, 1995. Subsequent to that Council in Committee meeting, the NCP Stage I document was revised to reflect Council comments and the document was approved by Council in July, 1995.

This final report, based on the framework established in Stage I, provides servicing details, development phasing, development guidelines, owner's agreements and cost sharing arrangements for services, amenities and neighbourhood facilities.

The plan responds to the intent outlined in the Local Area Plan (LAP) and represents a lengthy owner/municipal process involving numerous meetings and workshops with affected stakeholders. The resulting plan was developed with the owners' input and has their support.

Bound in this final report are the results of Stage I and Stage II. The document provides a comprehensive Neighbourhood Concept Plan for the East Newton Neighbourhood one.

2. Background Information

2.1 Site Location/Context

The East Newton Local Area Plan proposed to create two large neighbourhoods, one on the south side of 72nd Avenue and another on the north side of 72nd Avenue. The northerly neighbourhood is bounded by 152nd Street on the east, 72nd Avenue on the south, 144th Street on the west, and the Bear Creek environmental corridor, a BC Hydro corridor and the Guildford Golf Course to the north.

The study area, which was determined by Surrey, is one of three NCP areas for East Newton. The NCP1 study area follows the same boundaries as the northerly neighbourhood except the eastern boundary is located between 148th Street and 149A Street. (Figure 2.1.1).

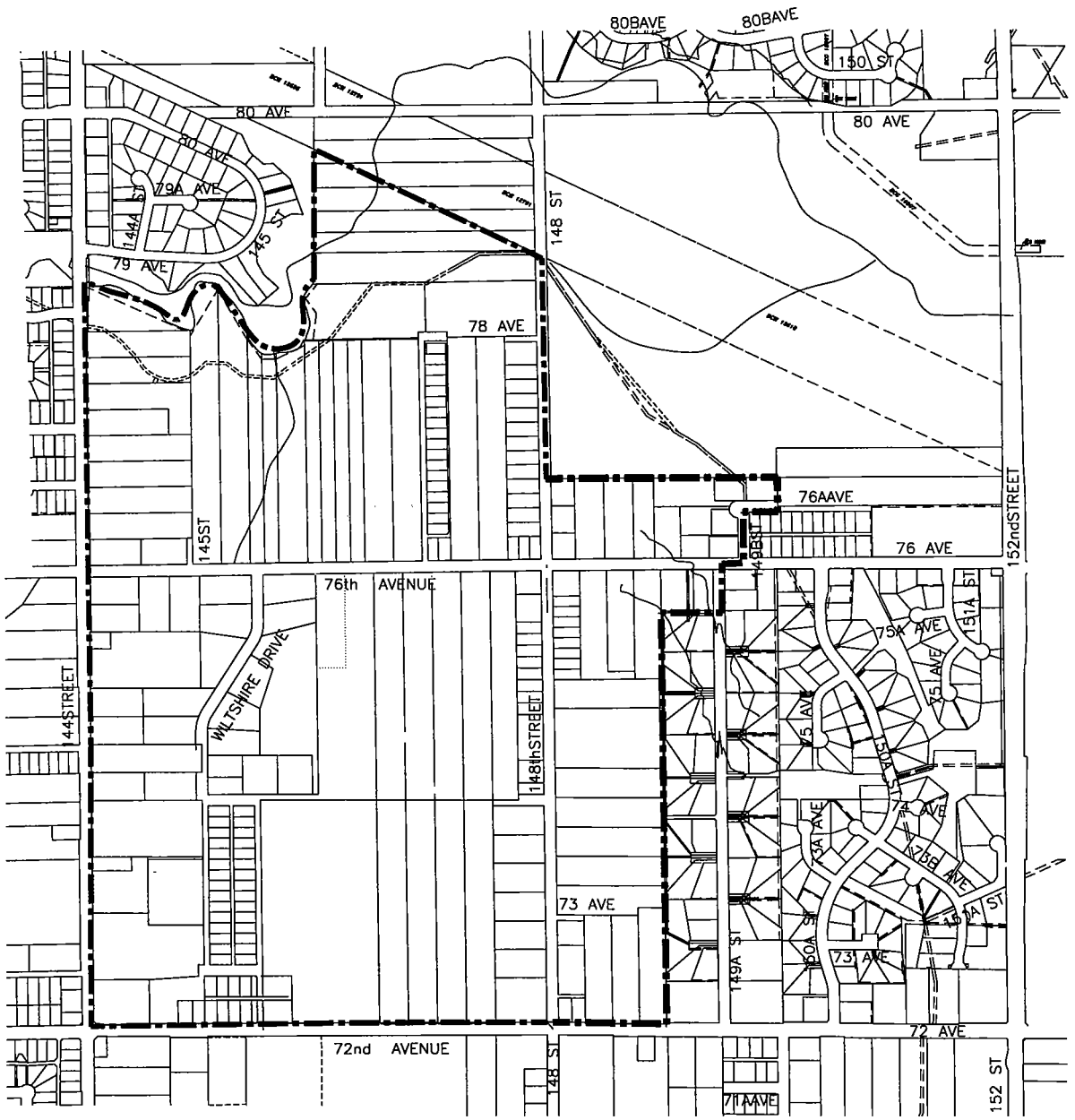
2.2 Existing Land Uses

The land covered by this NCP proposal contains 217 parcels with 158 existing single family dwellings (Figure 2.2.1). Approximately two thirds of these dwellings are located on parcels of land of less than 15,000 ft^2 They occur mainly along 145th Street, 145A Street, 147th Street, and 148th Street. The only non-residential land uses within the area are the Garden Centre on 72nd Avenue, the Newton Baptist Church on 144th Street, and a mushroom farm operation north of 78th Avenue adjacent to the Bear Creek area. Surrey is also a landowner in the study area.

EAST NEWTON

PROPOSED
NEIGHBOURHOOD CONCEPT PLAN

NCP AREA



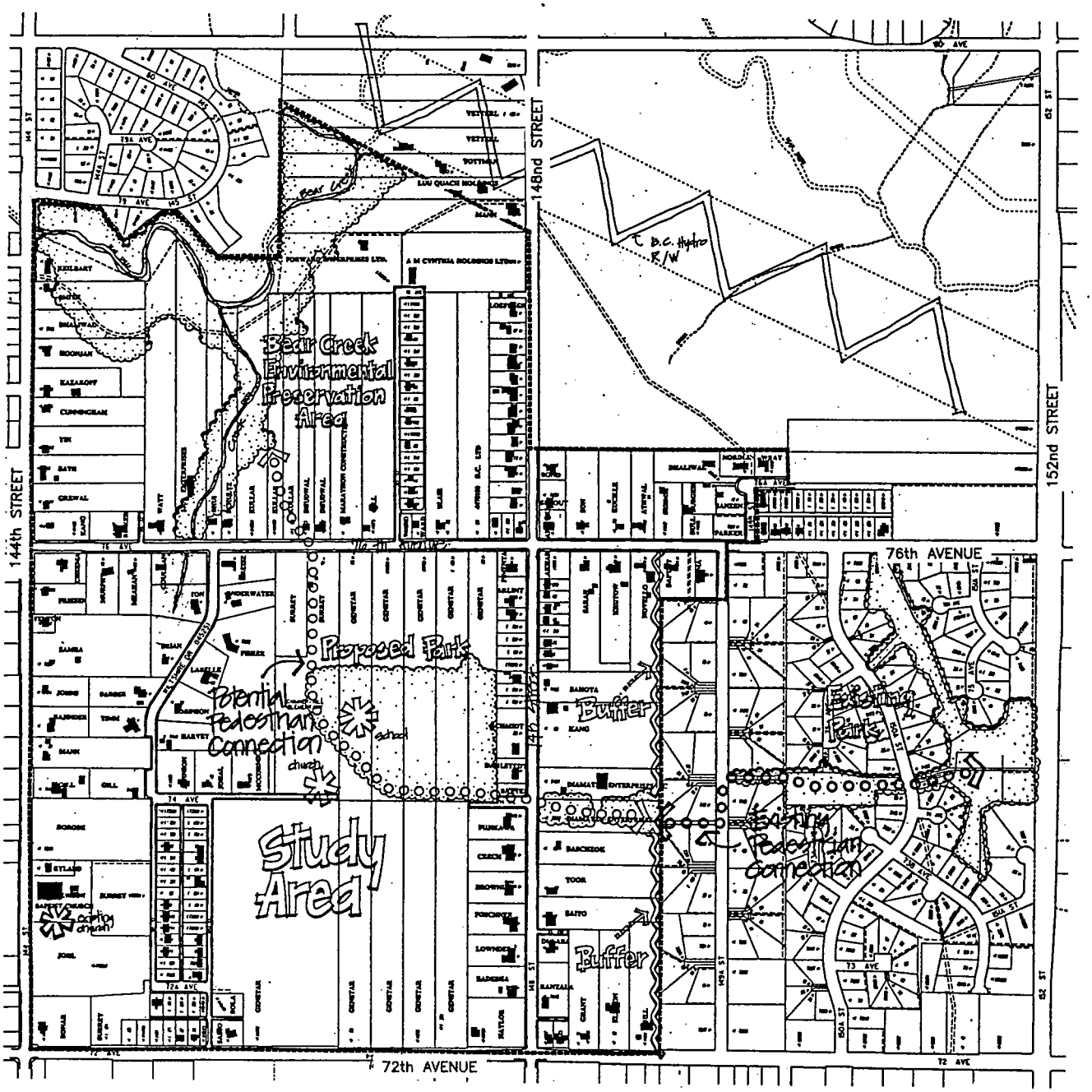
URBANSYSTEMS
SUITE 204
10711 CAMBIE ROAD
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 2.1.1

EAST NEWTON

PROPOSED
NEIGHBOURHOOD CONCEPT PLAN

EXISTING LAND USES
OPPORTUNITIES AND CONSTRAINTS



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10711 CAMBIE ROAD
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Fig. No. 2.2.1

2.3 Current Designation and Zoning

The current zoning for the majority of the land within the NCP is R-A (Residential Acreage). This zone is intended for single family housing on large suburban lots. The church property is zoned P-A (Assembly Hall) and the nursery lands are zoned commercial. The existing OCP is shown on Figure 2.3.1.

2.4 Topography

The land within the study area slopes generally to the northeast with a gradient of approximately five to eight percent. Bear (Mahood) Creek flows eastward along the north boundary and through the northwestern area of the NCP. The general topography and vegetation is shown on Figure 2.4.1.

2.5 Soils

The majority of the soils in the neighbourhood consist of Vashon Drift sediments (Va), which are composed of lodgment till (with sandy loam matrix), and minor flow till containing lenses and interbeds of glaciolacustrine laminated stony silt. In the northern portion of the neighbourhood around Bear Creek, is the less dominant soil type of Capilano Sediments (Ce), which are mainly marine silt loam to clay loam deposits. Capilano Sediments (Ce) are found in the southwest corner of the neighbourhood. This deposit consists of marine and glaciomarine stony (including till-like deposits) to stoneless silt loam to clay loam with minor sand and silt normally less than 3 m thick.

The Vashon lodgment till, which represent the majority of the neighbourhood soils, provides mainly good surface drainage and limited groundwater drainage. Capilano Sediments, a less dominant soil type, have potentially poor surface drainage in low lying areas.

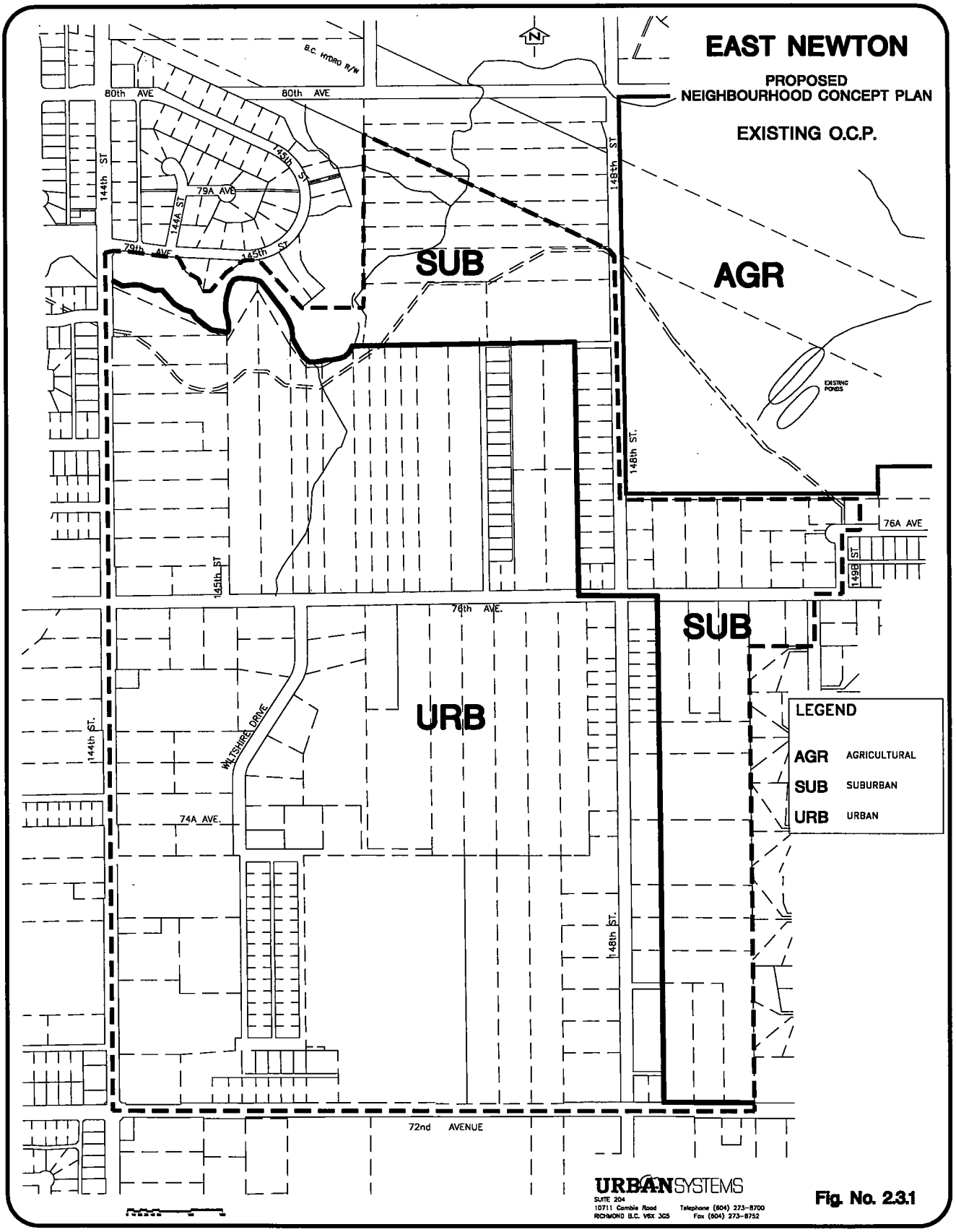
EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
EXISTING O.C.P.
B.C. HYDRO R/W
80th AVE
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
145th ST
148th ST
SUB
AGR
EXISTING PONDS
148th ST.
76A AVE
149B ST
145th ST
76th AVE.
SUB
URB
144th ST.
WILTSHIRE DRIVE
74A AVE.
148th ST.
72nd AVENUE
LEGEND
AGR AGRICULTURAL
SUB SUBURBAN
URB URBAN
URBANSYSTEMS
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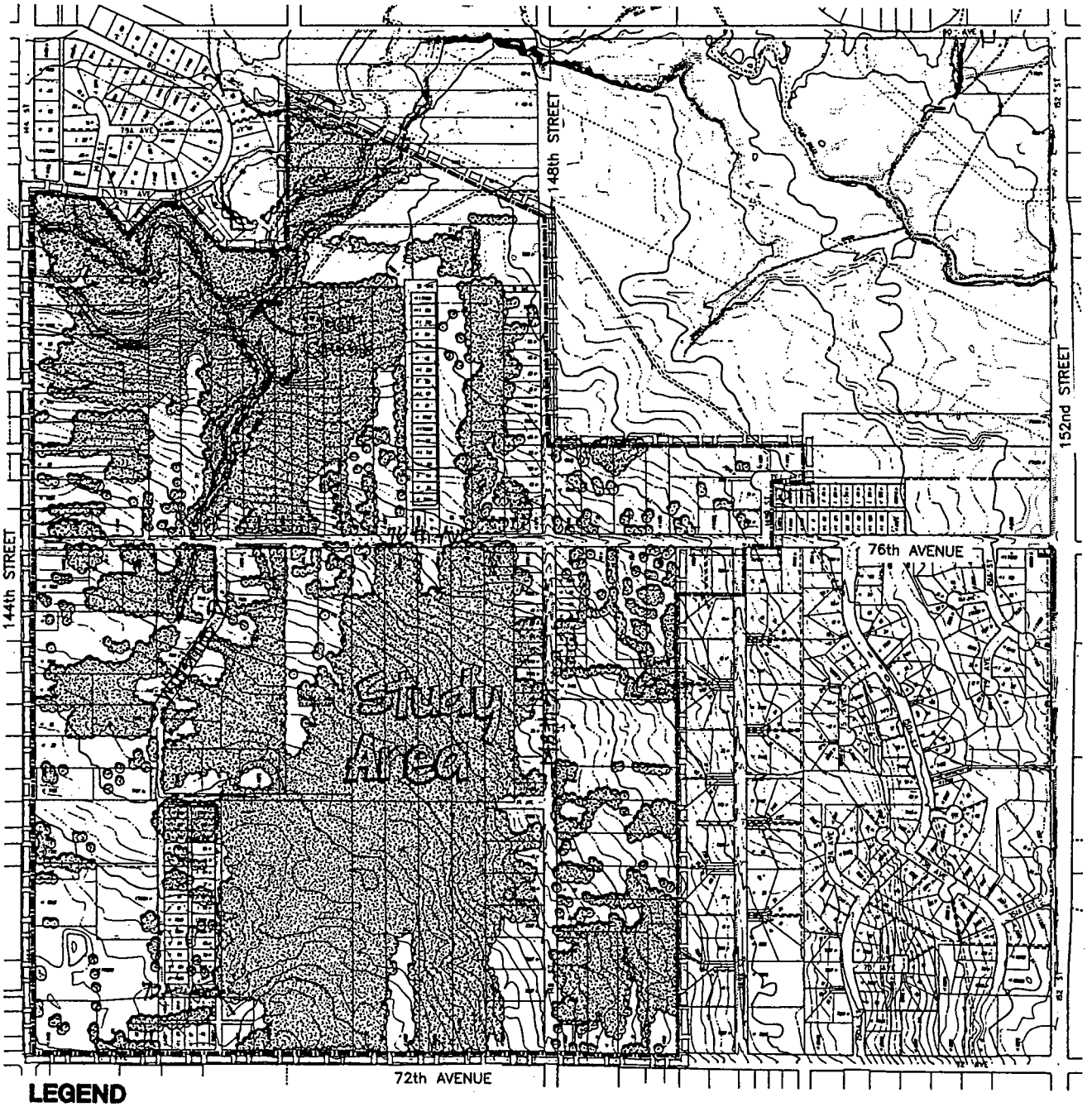
Fig. No. 2.3.1

EAST NEWTON

PROPOSED NEIGHBOURHOOD CONCEPT PLAN

CONTOUR AND VEGETATION MASSES



LEGEND

Vegetation (trees, bush)

1.0m Contours

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Fig. No. 2.4.1

2.6 Vegetation

The study area is currently a mixture of cleared land and mixed tree stands. Species observed in the area include western red cedar, western hemlock, Douglas fir, big-leaf maple, vine maple, black cottonwood, willow, western white birch, beaked hazelnut and red alder. A more detailed native vegetation species list is part of the report done by ECL Envirowest Consultants Ltd. (ECL), which is included in Appendix 1.

Vegetation in and adjacent to the ravines is considered important as discussed under the section titled Environmental Considerations.

2.7 Environmental Considerations

A study by Envirowest Consultants (ECL) based upon an initial field assessment provides a preliminary overview and assessment of the sensitivity and significance of the study area's watercourses, riparian areas, slopes and uplands. The initial overview was followed by a further bio-inventory and a raptor survey. The environmental overview, bio-inventory and raptor survey are all included in Appendix 1. ECL has reviewed the planning report and the stormwater management plan and found that they generally comply with the requirements of the environmental agencies and, more specifically, with the "Land Development Guidelines for the Protection of Aquatic Habitat" issued by the Federal Department of Fisheries and Oceans (DFO) and the BC Ministry of Environment, Lands and Parks (MELP).

Bear (Mahood) Creek is a significant stream supporting both anadromous (sea-going) and resident salmonoids, as well as a number of non-salmonoid species. There is only one significant tributary to Bear Creek in the NCP area. This tributary originates south of 76th Avenue and west of Wiltshire Drive. This stream does not support fish but is a productive food source. Recommendations for stormwater management are made to prevent further erosion and sedimentation within Bear Creek and to ensure that peak flows are not increased in the tributary. Preservation of this tributary, south of 76th, will be required up to the intersection of 75A Avenue and Whiltshire Drive. This is a requirement of the BC Ministry of Environment, Lands

and Parks (MELP). During subdivision of this area the applicants may wish to discuss refinements to the extent of the proposed preservation area.

The riparian zone adjacent to Bear Creek is a key component of the aquatic environment providing food, cover, shade and bank stability. This area is also an important area for wildlife due to its mature vegetation and proximity to water. The riparian zone of the tributary is also ecologically important. The MELP Land Development Guidelines require preservation zones (setbacks) of 15 horizontal metres from top-of-bank of Bear Creek and 15 horizontal metres from the top-of-bank of the unnamed tributary. All streams and their setback riparian zones must be permanently protected by way of registration of Restrictive Covenants in favour of the MELP.

The City of Surrey also requires a covenant over all lots adjacent to Bear Creek or the unnamed tributary which saves it harmless in the event of flooding plus a 7.0 m right-of-way in its favour from the top of bank (overlapping with the 15.0 m MELP setback zone) to permit access by the City for maintenance of the creek banks.

Along the northwestern boundary of area A1, the banks of Bear Creek are not clearly defined. In this area the 100 year flood plain level has been established as the top of the bank. The MELP have requested a 15 m setback from the 100 year flood plain level in this area. This will be defined in detailed mapping at the time of subdivision of properties along the northwest boundary of area A1 (Figure 3.4.1). The road entrance locations at 76th Avenue and 144th Street into area A1 have been set to meet transportation requirements and satisfy MELP.

The limit of the 15.0 m setback covenant line from the top of bank over each lot must be physically demarked by an impenetrable barrier with signing which complies with MELP criteria. This barrier may be in the form of fencing or landscaping and may include a gate. MELP criteria stipulate that all buildings must be constructed at least 5.0 m from the 15.0 m covenant line. The City of Surrey has stated that, where possible, it would prefer this building setback to be 7.5 m.

The environmental review and raptor survey of the NCP area did not reveal any threatened or endangered species (see Appendix 1). The

recommendation is that development should proceed in a sensitive manner to ensure that impacts to these species are mitigated.

The NCP is in general compliance with the MELP and Department of Fisheries and Oceans (DFO) "Land Development Guidelines" and reflects the refinements requested by these environmental agencies. The NCP environmental consultant ECL Envirowest Consultants Ltd. is in support of the stormwater management plan proposed by Urban Systems Ltd. (See Appendix 2).

2.8 Pet Cemetery

Located within the NCP area is an abandoned pet cemetery. We have determined through the current owner that this cemetery will pose no environmental or health risks nor was the cemetery used for any other purpose other than the burial of animals. The area in question is approximately 1394 m^2 (15,000 ft^2) in size.

The City of Surrey will not acquire this land for use as a public park. The City, however, encourages the citizens of the area to form a private society to assume ownership and/or maintenance and operation of the cemetery. It is appropriate that this issue be finalized with the Parks and Recreation Department of Surrey through a process separate from this NCP.

3. Owner / Municipal Consultation Process

3.1 Introduction

One of the original intents of the Neighbourhood Concept Planning process is to involve the area owners and to ensure that the plan developed reflects the desires of the owners and area residents.

The development of this Neighbourhood Concept Plan has embraced a lengthy owner involvement process that has taken into consideration owner feedback from as far back as May of 1993. Concentrated efforts were made to involve the owners through each step of the process which resulted in over 20 iterations of the Neighbourhood Concept Plan.

As shown on the list below, the area owners have had considerable opportunity to communicate their concerns and desires to the planning consultant through the use of the following:

- Direct Door to Door Contact
- Telephone Consultation/Inquiries
- Written Correspondence
- Questionnaires
- Formal Meetings
- Small Group Workshops
- Open Houses

In addition to the owner involvement, there was also ongoing participation by the City of Surrey's Planning and Development Department and the Engineering Department.

This Neighbourhood Concept Plan attempts to represent the desires of the majority of the area owners and is their vision of how they want the East Newton North Neighbourhood 1 planned and developed.

3.2 Ownership Statistics

Within the ± 320 acre NCP area there are 217 separate parcels owned by approximately 197 different owners. Of the 217 parcels, 98 parcels have no subdivision potential as they are less than 1394 m² (15,000 ft²) in size. Of the 320 acres within the NCP area there are approximately 288 developable acres. The average gross parcel size is less than two acres.

Many of the undevelopable parcels are owner occupied. The larger parcels tend to be vacant or have modest improvements.

Length of ownership of the properties varies. Some of the owners living on small acreage acquired the properties as far back as the 1960's, while some of the developable properties were acquired in the late 1980's. There has been few ownership transfers in the past three years.

The process has included a large number of owners, who have varied interests and desires but each was entitled to participate in shaping the plan and development pattern for the neighbourhood.

3.3 Local Area Plan Survey

In the Spring of 1993, the City of Surrey was considering an amendment to the Official Community Plan with implementation to occur through a new process, the Local Area Plan.

As a result of this, in May of 1993, one of the major land owners within this NCP area engaged a communications company to conduct a study to obtain the views of the owners on the proposed Local Area Plan. The East Newton North Neighbourhood falls within this study area and many of the survey findings were considered when developing the current Neighbourhood Concept Plan.

Over 250 responses were collected either in person or by telephone interviews and the respondents were asked to answer the questions on the attached sample questionnaire (Figure 3.3.1).

SURVEY INTERVIEW FORM

To assess neighbourhood reaction/opinion to the proposed East Newton Local Area Plan for the Genstar property at, 140th Street, between 72nd & 76th Avenues, Surrey.

ADDRESS: _____

SURNAME: _____ PHONE : _____

1. Number of people in household ? _____

2. Do you agree with Surrey's Planning Department recommendation; that the portion of the East Newton area should be redesignated to URBAN from SUBURBAN ? *YES / NO*

IF NO: What aspects of the plan would have to be changed, in order to gain your support ? _____

_____

3. Do you agree that a mix of housing types and lot sizes should be included in the plan ? *YES / NO*

4. What lot size would you prefer to see developed ? 4000 sq.ft / 6000 sq.ft
7000 sq.ft / 12000 sq.ft

5. Is it important to your family that future Urban development in this area be phased in over a period of years. ? *YES / NO*

6. Does your household have any other concerns or suggestions regarding the proposed East Newton Local Area Plan, or how this plan may effect the Genstar site ? _____

_____

_____

_____

This survey was completed on the _____ day of May, 1993

I, the undersigned, agree that these responses and statements may be entered into the minutes of any public hearing held by the Municipality of Surrey.

x _____ _____
Signature of Interviewee Interviewer

Local Area Plan Survey

For Detailed Results
See Support Document A3
Previously Submitted

Fig. No. 3.3.1

(May 1993)

As indicated on the survey area results map included as Figure 3.3.2, approximately 76% of the respondents were in favour of the area being included as a future urban area.

Respondents were also given the opportunity to indicate the housing mix and lot sizes desired for the area. The majority indicated that they wished to see a mix of housing types and lot sizes in the 557 m^2 (6,000 ft^2) range.

The respondents were also asked to indicate their concerns or suggestions, all of which were considered in the formulation of the Plan. The main issues raised include the following:

- "Mega housing" and secondary suites are not desired.
- Many properties in this area are without adequate sanitary sewer service and the respondents hoped they would come with the development of the area.
- Retention of trees and green space.
- Respondents felt that the area's infrastructure and amenities must be developed to keep pace with the future development of the area.
- Many owners wanted the opportunity to develop as soon as possible and were in favour of the Local Area Plan.
- Some owner's with property not in the urban area requested inclusion of their lands.

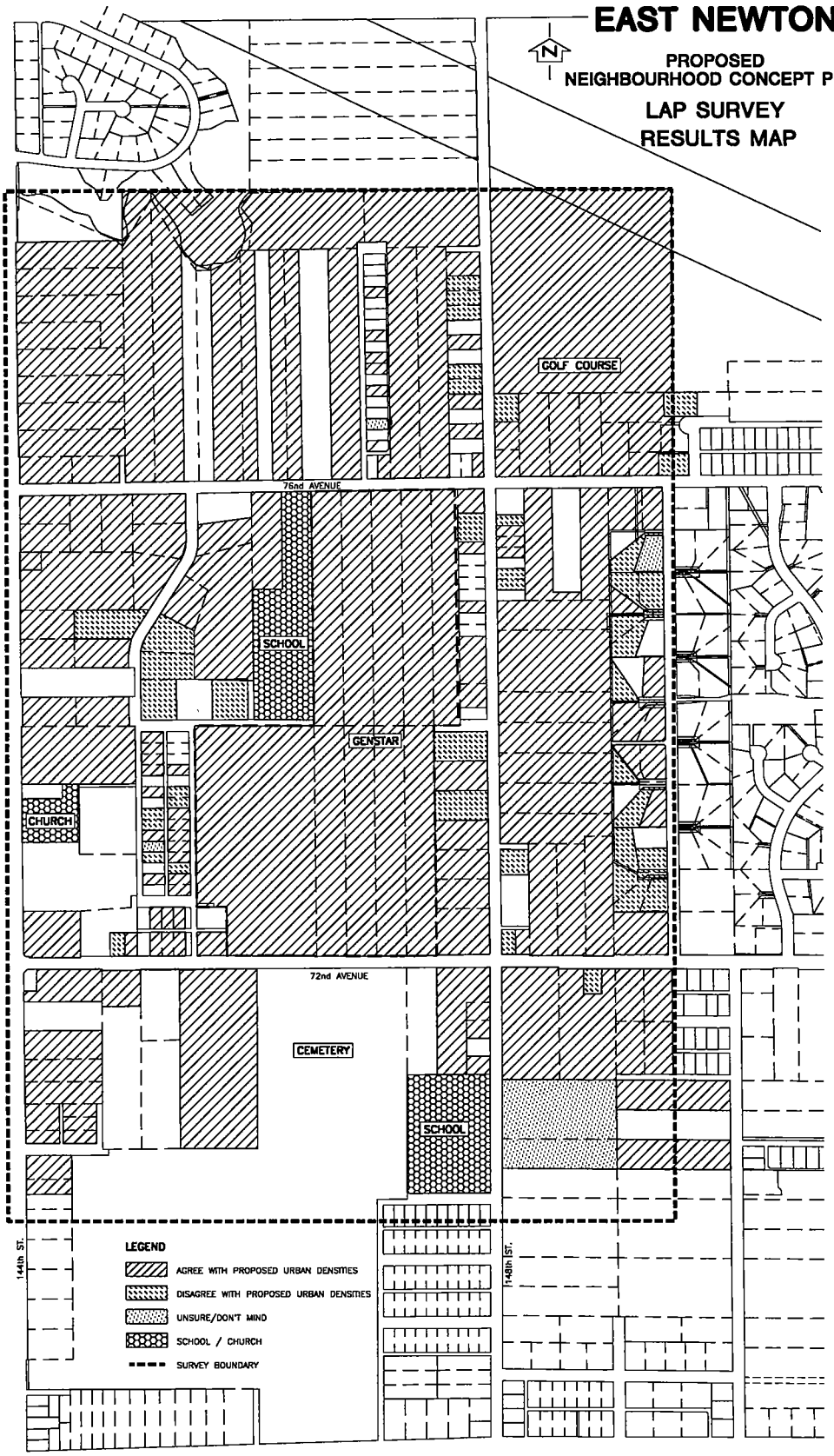
The concerns raised were considered by the consultants in the development of this Neighbourhood Concept Plan. This was the beginning of a lengthy public consultation process.

A copy of the 1993 report by the communication consultant was previously submitted as part of the support documents during the Stage 1 process.

EAST NEWTON

PROPOSED NEIGHBOURHOOD CONCEPT PLAN

LAP SURVEY RESULTS MAP



URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 3.3.2

3.4 Steering Committee

In April of 1994, a group of owners interested in the initiation of the NCP process met, and based on discussions with and guidance from the City of Surrey Planning staff, a Steering Committee was formed to commence the owner consultation process. This Steering Committee was comprised of land owners and representatives of the land owners who wanted to play an active role in the implementation of the NCP process.

Since the NCP area is ±129.5 hectares (±320 acres) and has a large number of individual owners, it was decided that the NCP area should be broken down into four manageable sub-areas based on existing development, street layouts, natural boundaries and ownership patterns. These sub-areas are identified on the following plan (Figure 3.4.1). Since each of these sub-areas seemed to have its own unique combination of planning constraints and opportunities, each was to be represented by at least two members on the Steering Committee.

The sub-areas were represented by the following individuals who either own land within the sub-area or represented land owners who do:

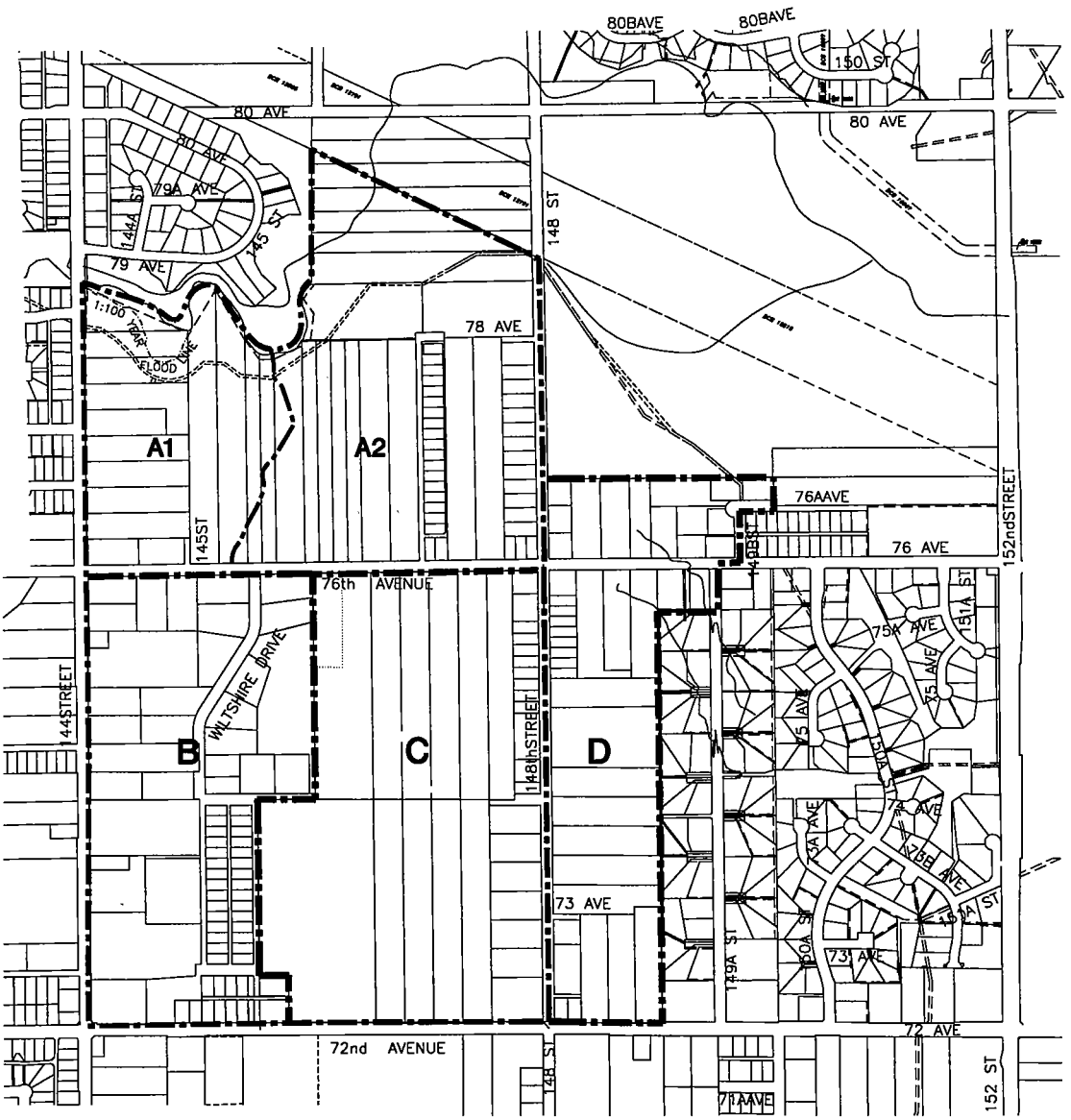
Area A:	Mr. Doug Kazakoff	(subsequently area A was divided
	Mr. Arvind Nair	into A1 and A2 sub-areas)
Area B:	Mr. Avtar Johl	
	Mr. Larry Fisher	
Area C:	Mr. Lyall Armstrong	
	Mr. Geoffrey Heu	
Area D:	Mr. Bhim Sen Nair	
	Mr. Lloyd Eliason	
	Mr. Amrit Toor	

Since the NCP is to reflect the desires of the area owners, the main role of the Steering Committee was to provide a mechanism of communications for the owners within each sub-area to express their concerns and suggestions to the Planning and Engineering consultants and to keep the sub-area owners informed about the NCP process on an ongoing basis.

EAST NEWTON

PROPOSED
NEIGHBOURHOOD CONCEPT PLAN

NCP SUB AREAS



URBANSYSTEMS
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10711 CAMBIE ROAD
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 3.4.1

In addition, the Steering Committee also had other duties which included:

- liaising with individual owners
- arranging owner meetings and workshops
- liaising with Surrey Staff
- engaging and directing the Consultants

From the beginning of the process, the sub-area representatives have been involved with their constituents and have had direct contact with the majority of the owners in the area.

The Steering Committee met approximately every two weeks to discuss various NCP related matters and to bring forward the concerns and suggestions of the owners.

3.5 NCP Initiation

Support of over 50% of land owners or support of 70% or more of the developable land area was required by the City of Surrey prior to initiating the Neighbourhood Concept planning process. The Steering Committee decided to quantify this support by initiating contact with the owners.

A questionnaire was developed to assist the Steering Committee representative to document support for the initiation of the NCP and to collect the preliminary input on the planning and development of the area. A copy of this questionnaire follows as Figure 3.5.1. The Steering Committee agreed to canvass their respective sub-areas to collect the owner responses and to inform the owners of the Neighbourhood Concept Plan process. Even at this initial stage, many different techniques were used to contact and inform the owners including:

- Door to Door Canvassing
- Direct Mail
- Telephone Interview
- Neighbourhood Meetings

Individual letters were sent to all owners regardless of place of residence.

EAST NEWTON NORTH N.C.P. STUDY

Owners Name: _____ Date: **(April 1994)**

Phone Number: _____

Property Address: _____

_____

_____

1) Are you aware of Surrey's Neighbourhood Concept Plan (N.C.P.) process?

Yes _____ No _____

2) Do you agree that for orderly development to occur, the Neighbourhood Concept Plan process should be initiated?

Yes _____ No _____

3) a) Do you live in the east Newton Area?

Yes _____ No _____

b) If yes, do you intend to continue to live in your home in the long term?

Yes _____ No _____

c) If No, why?
(ie will tear down and develop, will move when development starts in area etc.)

_____

_____

_____

_____

4) Are you interested in developing your property in the near future?

Yes _____ No _____

5) Do you have any Comments, Ideas or Concerns that you would like to have addressed in the plans that are prepared for the development of this area?

_____

_____

_____

_____

_____

_____
Signature of Respondent

NCP Initiation Questionnaire

For Detailed Results
See Support Document A3
Previously Submitted

Fig. No. 3.5.1

By the end of May 1994, the majority of owners were surveyed and 71% of the developable land within the NCP area supported the initiation of the NCP process.

Total NCP Area ±129.5 hectares (±320 Acres)

Developable Acreage ±116.5 hectares (±288 Acres)
(excluding road allowances, unsubdividable lots)

Theoretical Developable Area $\frac{116.5}{129.5} = 90\%$

Developable Acreage in favour of NCP process
±83.4 hectares (±206 Acres)

Percentage of Developable Area in favour of NCP process $\frac{83.4}{116.5} = 71.5\%$

Surrey's requirement for support of the Neighbourhood Concept planning process was met. The result of this survey is displayed pictorially by Figure 3.5.2.

In the course of compiling this support, the area representatives had considerable contact with many of the owners and through conversations, meetings, and the written questionnaire responses, issues came to light. The following is a sample of some of the issues and concerns raised:

- Suburban areas should become urban.
- Yields should be maximized.
- No mega housing and secondary suites.
- Ensure adequate servicing for all properties.
- NCP is too complicated.
- Multi-Family Housing not desired.
- Some existing lot owners wanted status quo.
- Planning process is slow.

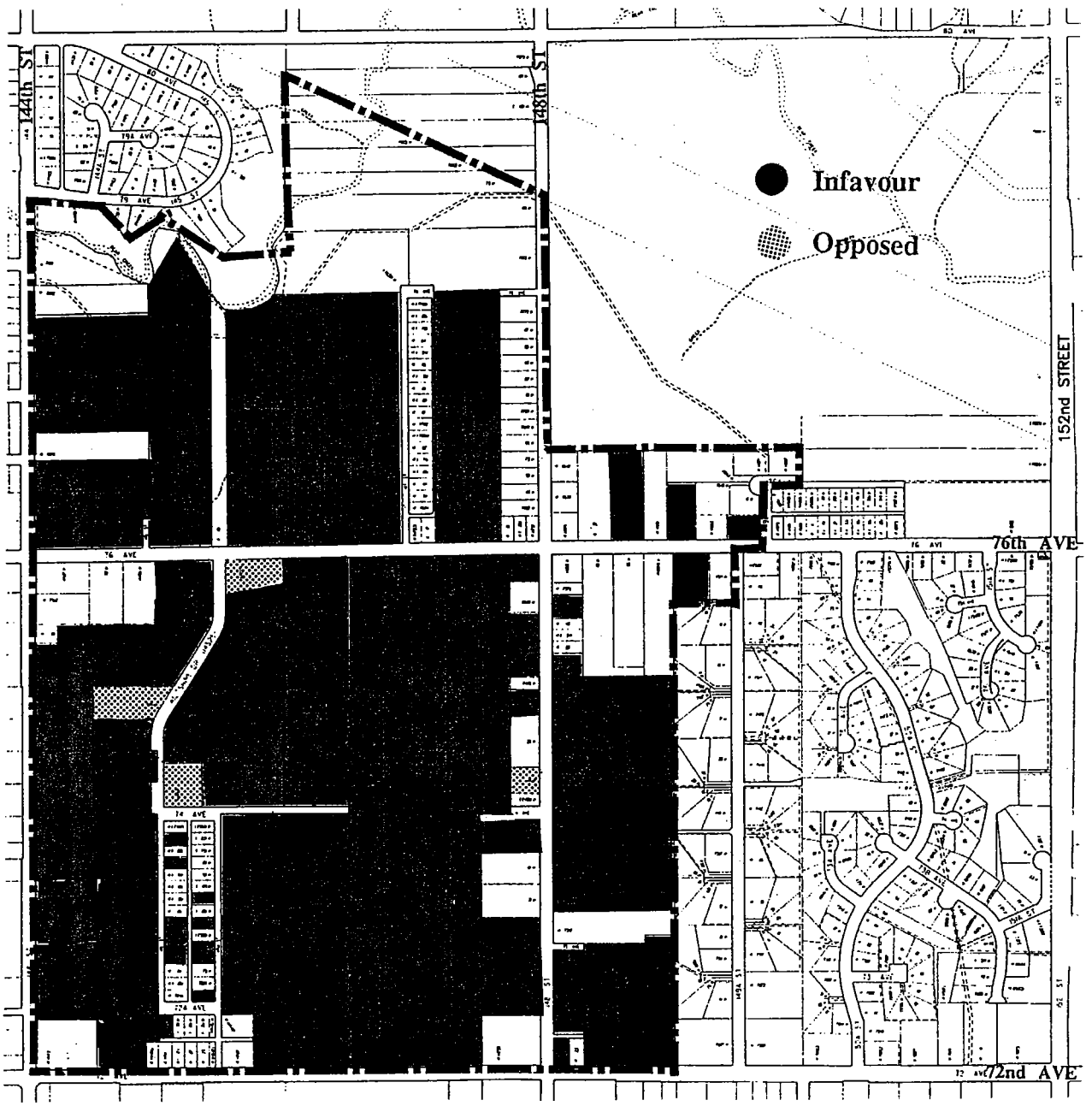
These suggestions and concerns were considered by the Consultants and the Steering Committee and those that could be supported have been reflected in the Neighbourhood Concept Plan. The questionnaires obtained prior to starting the process were included in previously submitted support document A2.

EAST NEWTON

PROPOSED
NEIGHBOURHOOD CONCEPT PLAN

INITIATION SURVEY
RESULTS MAP

N.C.P. AREA



For Detailed Results
See Support Document A3
Previously Submitted

Fig. No. 3.5.2

(June 1994)

URBAN SYSTEMS
SUITE 204
10711 CAMBIE ROAD
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

3.6 Steering Committee Meetings/Minutes

The Steering Committee met on a regular basis to discuss the preparation of the NCP.

At many of the meetings, the Planning and Engineering Consultants were present to hear first hand the feedback coming from the owner involvement. Detailed minutes were also taken of all meetings to ensure that the Consultants and Surrey staff had a record of this owner participation and input.

At some of the crucial Steering Committee meetings, Ms. Wendy Whelen of the Surrey Planning and Development Department was also present to hear the discussions and to provide guidance.

All members of the Steering Committee, the Planning and Engineering Consultants, and the Surrey Planning and Development Department have been given copies of these minutes. They were included in previously submitted support documents B2 and B3.

3.7 Independent Sub-Area Plans

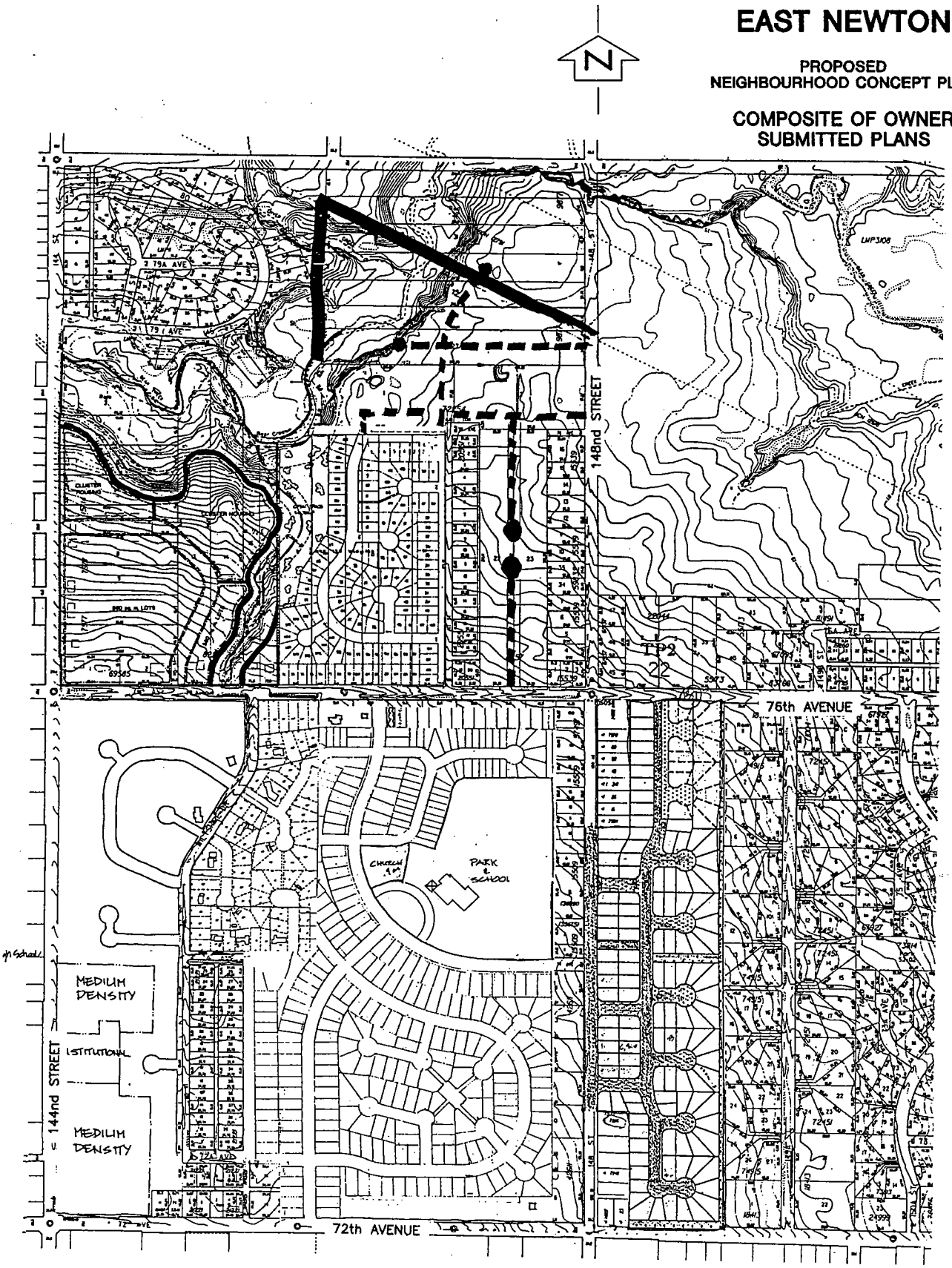
Based on this initial contact and the responses from the individual owners, the more organized areas engaged independent planning consultants to develop individual concept plans for their sub-areas based on their interpretation of the LAP. A composite of the individual owners plans is included as Figure 3.7.1.

On May 26, 1994, these plans were submitted to the Planning and Engineering Consultants and formed the starting point for the owner initiated Neighbourhood Concept Plan. Although, these plans originally lacked continuity with the adjacent sub-areas, they accurately reflected the desires of the owners at that time and provided a good starting point.

EAST NEWTON

PROPOSED NEIGHBOURHOOD CONCEPT PLAN

COMPOSITE OF OWNER SUBMITTED PLANS



URBANSYSTEMS
SUITE 204
10711 CAMBIE ROAD
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 3.7.1

3.8 Formal Owners Information Meeting

Based on further input from the area owners through the Steering Committee, the draft NCP was revised a total of 9 times. When a plan was achieved which the Steering Committee felt best reflected the desires of the owners, a formal information meeting was called to present the plan for the owners critique.

This meeting took place on the evening of July 6th, 1994 at the Pacific Bible College at 15100 - 66A Avenue. The owners of all 217 parcels within the NCP area were invited by mail to attend.

The objectives of the meeting were to:

1) introduce the consultant team to the owners.
2) further explain the NCP process.
3) introduce the draft NCP.
4) introduce the preliminary engineering criteria.
5) collect owner input and critiques in order to further improve the plan.

Approximately 120 owners attended this meeting. Surrey's Planning and Development Department was represented by Ms. Judi Robertson . In addition to the NCP facilitators, two representatives from each of the engineering consultant and the planning consultant teams were on hand to give presentations, answer questions and to gather owner input.

This meeting commenced with a formal presentation by the facilitator, and was followed by presentations from the Consultants. The owners were then given the opportunity to discuss their individual concerns on a one-on-one basis with the consultants and facilitators. Subsequently, there was a formal question and answer period when the floor was open for questions, comments and recommendations from the owners.

Feedback questionnaires were distributed to all participants in order to provide a means for the owners to contribute to the planning process and many of these were returned. Detailed minutes were also taken to record any verbal input from the area owners. These were later forwarded to the Planning and Engineering Consultants. A copy of the feedback questionnaire is attached as Figure 3.8.1 and copies of the completed forms

Date: July 6, 1994

N.C.P. EAST NEWTON FEEDBACK

Property Address: _____

Owner's Address: _____

_____

Owner's Name: _____

1. Are you generally satisfied with the first draft of the plan that was presented tonight?

_____

_____

_____

2. What alternatives if any would you like to see included in the second draft of the plan?

_____

_____

_____

3. Are there any general comments you would like ot direct to the Consultants or to the Steering Committee?

_____

_____

_____

_____

_____

Signature

Please return your comments to the desk at the door.

Information Meeting Feedback Questionnaire

For Detailed Results
See Support Document A3
Previously Submitted

Fig. No. 3.8.1

and the attendance list was included in previously submitted support document A3.

One of the requests of the owners was to have a smaller forum to allow them to address specific issues relating to their sub-areas and to discuss various individual NCP concerns with the facilitators and the Consultants. The owners felt that the formal meeting format was too large to allow them to communicate their concerns adequately. Based on these requests, the Steering Committee organized a series of sub-area workshops to allow better interaction with the owners and to discuss specific issues relating to each sub-area.

3.9 Workshops

Sub-Area workshops were held at the Pacific Bible College on the following evenings in August, 1994:

August 8	Area B
August 9	Area C
August 10	Area A2
August 15	Area D
August 16	Area A1

All the owners were contacted by direct mail and were informed about the purpose and location of these workshops. The meetings all commenced at 7:00 pm and lasted an average of three hours with one meeting lasting over five hours. The workshops were attended by 12 to over 40 owners depending on the sub-area.

The format allowed for a formal presentation by the facilitator and at least one consultant. The topics reviewed included:

- NCP Process and Procedures
- Planning Rationale
- Engineering Considerations
- Draft NCP

Following the formal presentations, the discussions focused on more sub-area related issues. This was a very effective opportunity for the owners, consultants and facilitators to speak specifically about individual concerns. A number of the owners had misconceptions about the NCP process and the draft NCP and discovered that their concerns were unfounded once their questions were answered.

Again, feedback questionnaires (Figure 3.9.1) were distributed and minutes were kept and then forwarded to the consultants for consideration. These were included in a previously submitted support document A4.

The Sub-Area D Workshop lasted over five hours and this resulted in significant alterations to the draft plan for their area. For this reason, a second workshop was held for this sub-area on August 23rd, 1994 for these owners to view and comment on the changes. The results of this meeting were included in a previously submitted support document A4.

The Area D meetings were attended by Ms. Wendy Whelen of the City of Surrey.

3.10 Public Open House (October 27,1994)

Based on the issues and comments raised by the NCP owners at the July 6, 1994 formal meeting and the six Sub-Area workshops, and other contacts with the area owners, the Neighbourhood Concept Plan was further revised.

An Open House Meeting was scheduled to:

- introduce the latest draft of the plan.
- gather owner and public input and feedback.
- inform the adjacent owners of the plan.
- allow the owners to speak on a one-to-one basis with the Consultants, the Facilitator, the Surrey planner and their sub-area representatives.
- inform the owners who did not participate in the earlier owner consultation opportunities.

Date: August 8, 1994

N.C.P. WORKSHOP FEEDBACK

Property Address: _____

Owner's Address: _____

_____

Owner's Name: _____

1. Are you generally satisfied with the current draft of the plan that was presented tonight?

_____

_____

_____

2. What alternatives if any would you like to see included in the next draft of the plan?

_____

_____

_____

3. Are there any general comments you would like to direct to the Consultants or to the Steering Committee?

_____

_____

_____

_____

_____

Signature

Please return your comments to the desk at the door.

Workshop Feedback Questionnaire

For Detailed Results
See Support Document A3
Previously Submitted

Fig. No. 3.9.1

This Open House took place on October 27, 1994. The owners within the NCP were informed and invited by personally addressed mail. In addition to the sub-area owners, owners living within 100 metres of the NCP area were also invited through a direct mailing. The City of Surrey provided a name and address list of over three hundred of these owners and in total over 500 personally addressed invitations were sent out. Over 120 participants attended this function which lasted from 4:00 pm to 9:00 pm.

The planning and engineering Consultants provided over twenty displays outlining the background information and the planning and engineering concepts involved with the NCP. Their staff members were available to answer questions from the public as were the representatives for each sub-area. The environmental Consultant was also on hand to address any environmental concerns that any owner may have had. Ms. Wendy Whelen of the Planning and Development Department also took an active role in the Open House and was responsible for addressing questions relating to the process and any other concerns the owners had.

As in the other owner consultation functions, feedback questionnaires (Figure 3.10.1) were distributed to all the attendees to allow them a further opportunity to contribute to the planning process. Approximately 60 questionnaires were completed and returned.

In response to Question 6, "Does this plan in general terms reflect your overall expectations for the neighbourhood?", approximately 75% of the respondents responded positively.

All Questionnaires were forwarded to the consultants and were previously submitted as support document A5.

3.11 Area D Open House (February 13, 1996)

At the request of the Planning Department, an Open House meeting was scheduled in February, 1996 to review the suburban to urban transition area with the Area D owners and the owners of property adjacent to this transition area.

Invitations to this function were sent by direct mail. The Planning Department staff and the Area D Steering Committee members were on

EAST NEWTON NCP1
COMMENT SHEET

October 27, 1994

Owner's Name: _____

Property Address: _____

Phone Number: _____ Signature _____

		Yes	No
1)	Is your land within the boundaries of the NCP?	_____	_____
2)	Did you attend the July 6th owner's meeting?	_____	_____
3)	Did you attend the August sub-area workshops?	_____	_____
4)	Do you feel the Planning Consultants have addressed the main land use issues?	_____	_____
5)	Do you feel the Engineering Consultants have addressed the main servicing issues?	_____	_____
6)	Does the plan in general terms reflect your overall expectations for the neighbourhood?	_____	_____

7) List the 3 most important attributes of the plan.

_____

_____

_____

8) List the 3 most important shortcomings of the plan, if any.

_____

_____

_____

9) In which sub-area does your land fall? (circle one)

A B C D Beyond Boundary

10) Please give us your general comments on the plan and the process.

_____

_____

_____

_____

PLEASE RETURN YOUR COMMENTS TO THE DESK AT THE DOOR

Open House Questionnaire

For Detailed Results
See Support Document A3
Previously Submitted

Fig. No. 3.10.1

hand to answer any questions. The meeting was well attended and display panels depicting aerial and cross-section views of the existing vegetation and the proposed transition area were provided to accurately inform the owners of what is planned for this area.

Feedback sheets were distributed to solicit comments from the participants and approximately 80% of the respondents answered positively to the proposal by Area D owners to seek an easterly expansion of the urban designation to accommodate large urban lots and a vegetated buffer to act as the requisite transition.

3.12 Informal Owner Consultation

In addition to the above owner consultation functions, the facilitators, the consultants and the sub-area representatives have had extensive consultation with individuals and small groups in an informal manner.

Many of the owners in the sub-areas were well organized and held their own meetings on a regular basis. The results of these meetings were communicated to the Steering Committee and the consultants through the sub-area representatives. There were occasions when the consultants met individually with the sub-area representatives to deal with very specific concerns of individual owners.

In Area D, the Steering Committee members consulted with the adjacent owners outside the plan area and collected the response forms included in previously submitted supporting document A6. Copies of any correspondence on any part of the NCP process are also contained in the same document.

3.13 City of Surrey Involvement

The City of Surrey staff have been involved with this NCP process since December of 1993. Meetings were held with both the Planning and Development Department and the Engineering Department as necessary.

The Planning and Development Department NCP Coordinators for this area are Mr. Nicholas Lai, Manager, Central Surrey and Ms. Wendy

Whelen, Senior Planner. Ms. Whelen was Ms. Judith Robertson's replacement. Ms. June Christy of Surrey Planning joined the NCP team in November 1995. The NCP Coordinator for the Engineering Department was initially Mr. Fraser Smith, Manager, Land Development. Mr. Smith was recently succeeded by Mr. Jorgen Johansen.

The Planning staff in particular, were involved with many of the owner consultation functions. Ms. Judith Robertson attended the July 6th formal meeting and Ms. Wendy Whelen attended some of the Sub-Area Workshops. Ms. Whelen was also present at key Steering Committee meetings and provided guidance on numerous NCP issues. She also took an active role at the NCP Open House. Mr. Nicholas Lai attended the October 27th Open House and observed the efforts of the Steering Committee and owner consultation process. The Area D Open House on February 13, 1996 was organized and facilitated by Ms. Whelen and Ms. Christy.

The Planning and Development Department was kept informed of all events and issues and was provided with minutes of all Steering Committee functions. Area owners also contacted the Planning and Development Department directly to address their NCP concerns.

The minutes of the meetings with the Planning and Development Department and the Engineering Department were previously submitted as document B3.

3.14 Issues Arising From the Public Consultation Process

Many issues were raised by the owners over the course of the public consultation process and were considered by the Planning Consultant in the development of the Neighbourhood Concept Plan. Following is a list of the main issues raised during the public consultation process. A complete list of all issues raised during each owner consultation function was shown in previously submitted documents A1 through A6.

GENERAL ISSUES	RESOLUTIONS
1. Architectural Guidelines were requested by many of the owners to ensure a high housing standard.	1. Architectural Guidelines are being proposed for this Neighbourhood Concept Plan.
2. Mega Housing is not desired.	2. Within the proposed Architectural Guidelines, the issue of mega housing is dealt with.
3. Ensure all areas will be adequately serviced to urban standards.	3. The engineering consultant has designed a conceptual system which is capable of providing urban servicing.
4. Concern about increase in traffic.	4. The transportation engineer was retained and has put forward recommendations.
5. NCP process is too long and complex.	5. The Steering Committee made efforts to expedite this NCP process with assistance from the facilitator and the City staff.
6. Ensure all owners have input into the process and a means to communicate with the consultants.	6. The formal meetings, Open House and workshops provided many opportunities for the owners to contribute to the process.
7. Owners feel that road layouts should consider all future potential development and allow properties to develop independently.	7. The plan has considered the potential development of all properties. However, it is impossible to ensure that every property can develop independently.
8. Secondary suites are not desired for the neighbourhood.	8. The architectural controls and City of Surrey Bylaws should deter the development of secondary suites for this area.

GENERAL ISSUES	RESOLUTIONS
9. Maximization of lot yields.	9. Lot yields have been planned in accordance with the Local Area Plan and the development potential of each parcel has been considered.

AREA A1 ISSUES		RESOLUTIONS	
1.	Opposition against aligning loop road at 77th Avenue. Residents feel road should be aligned at 77A.	1.	The alignment of this road has been altered and is now located further north, at approximately 78 Avenue.
2.	The limit of development adjacent to Bear Creek is uncertain at this time.	2.	This matter will be further examined in the subdivision application stage as it requires detailed, site specific examinations.
AREA A2 ISSUES		**RESOLUTIONS**	
1.	In an earlier plan, 147A Street, north of 76th Avenue contained two cul-de-sacs which the adjacent owners strongly objected to.	1.	These cul-de-sacs were removed from the plan. 147A is now a through street.
2.	The owners on 148th Street do not favour the number of roads connecting to the north end of 148th.	2.	The transportation engineer reexamined this in Stage II. The number of accesses has been reduced.

	AREA B ISSUES		RESOLUTIONS
1.	Owners objected to the church site proposed on an earlier plan.	1.	The church site has been removed from the plan.
2.	Objection to having 74th Avenue as a continuous local road.	2.	The current plan does not include a continuous road.
	AREA C ISSUES		**RESOLUTIONS**
1.	Objection to the relocation of the school site.	1.	The location of the school site was outlined in the Local Area Plan which was followed by the consultant.
2.	Access to the rear of the properties located on West side of 148th to be provided for.	2.	This has been reflected in the current plan.
3.	Owners would like 148th Street (76th to 72nd) upgraded to urban standards.	3.	This road will eventually be upgraded to urban standards.
4.	Ensure properties located adjacent to the school are properly buffered.	4.	The school board "template" shows a 50 foot buffer around the school site.

AREA D ISSUES	RESOLUTION
1. The owners in this sub-area insisted on an increase in the urban designated area on their lands and a decrease in the suburban transition area. There were also concerns raised against the proposed plan from the adjacent area located to the East of Area D.	1. The requests of the Area D owners have been fulfilled. The urban area has been increased and a 6 m landscaped transition area has been provided along the eastern boundary. This transition area may be protected by a proposed Restrictive Covenant. Additional planting of trees may be required to enhance this transition area. While the lots are smaller than anticipated in the LAP they are still sufficient to act as a transition.

4. NCP Design Criteria

4.1 Public Input

The public concerns have resulted in design responses as outlined in Section 3.0.

4.2 Opportunities and Constraints

The East Newton North Neighbourhood Plan is an opportunity to accommodate the need for urban growth by creating a neighbourhood that will benefit both existing and new residents.

The Neighbourhood Plan was developed to respect the existing residents and the 158 existing single family lots in the community. The extensive public consultation process evolved to address the issues and concerns raised by the residents.

The topographic, vegetation and environmental considerations have influenced the potential area for development and the servicing of these lands. Setbacks and preservation zones were reviewed to ensure that Bear Creek and the unnamed tributary were sensitively incorporated into the Neighbourhood Plan. Servicing concepts have been designed to work with the natural topography as much as possible. A wet detention pond has been proposed and sited to have minimal environmental impact.

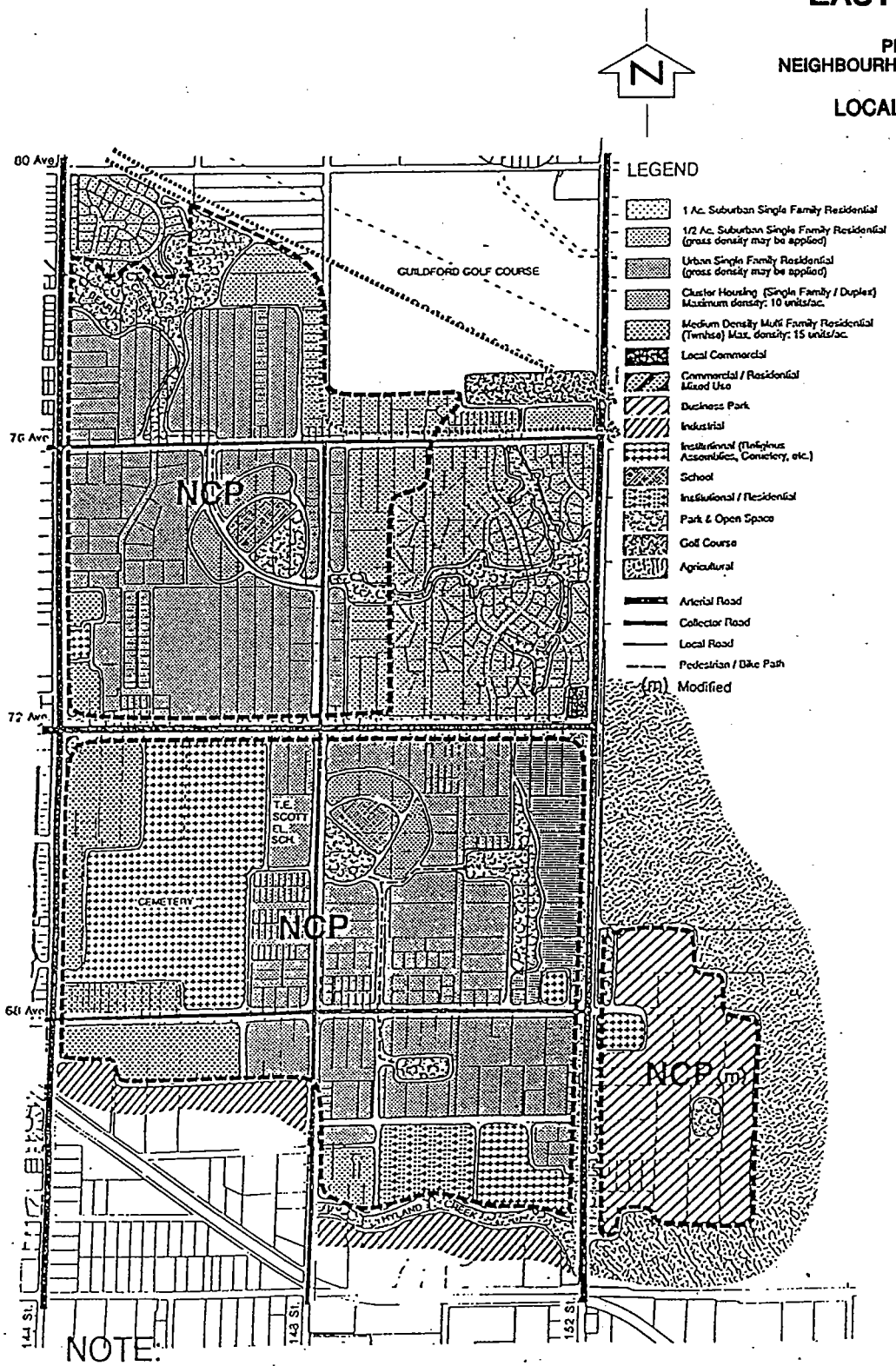
4.3 LAP Development Objectives and Issues

The East Newton Local Area Plan (LAP) included as Figure 4.3.1 was the starting point for the NCP and was followed closely.

EAST NEWTON

PROPOSED NEIGHBOURHOOD CONCEPT PLAN

LOCAL AREA PLAN



NOTE:

— — — THE BOUNDARIES ARE SUBJECT TO CHANGE AND ADJUSTMENTS

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Fig. No. 4.3.1

Objectives

The development objectives for the East Newton Neighbourhood Land Use Plan respond to the need for urban growth and attempt to provide neighbourhoods that are sensitive to the environment, the residents who are in the area and those who will move into the neighbourhood. Key objectives include:

- provide a variety of housing types from low to medium densities.
- create a transportation system with various transportation alternatives to accommodate the increase in circulation demands and opportunities for non-motorized means of travel.
- offer a range of functions, services and activities as a community focus.
- protect and enhance the natural topography and environment.
- consider urban design and architectural features that create interest and human scale.
- provide a range of adequate community facilities to meet the educational, recreational and social needs of the local population.
- extend municipal services to accommodate the servicing needs of the community.

Issues

During the public consultation process for the East Newton LAP, issues arose which the NCP plan attempts to address. They are as follows:

Overall Land Use Pattern

There should be a logical pattern of land use which includes a variety of low to medium density residential enclaves while protecting existing pockets of established suburban dwellings.

The area will consist predominantly of urban single-family residential, with a component of cluster housing in the form of small lots and small single or semi-detached housing surrounding the neighbourhood park/elementary school site. The joint school/park site is the focal point of the area.

A medium density enclave in the form of townhouses is proposed at the western edge of the neighbourhood at 72nd Avenue along 144th Street.

Parks and Open Space

Substantial amounts of parkland should be provided to incorporate major natural features such as Bear Creek and the unnamed tributary. Gross density zoning should be considered in the area along Bear Creek where environmentally sensitive areas need to be preserved.

Park land/open space should include active and non-active components as well as linear linkages for walkway/bicycle way. The Bear Creek area will provide a significant amount of passive parkland, and the active parkland will be situated adjacent to the proposed elementary school.

A linear open space system should be developed to accommodate walkways and bicycle paths connecting parks, schools, local commercial area, community facilities and transit stops. A linkage should be provided connecting 148th Street to the existing open space system east of 149th Street.

School Facilities

Adequate school site facilities should be provided. The facilities should also be utilized for community services in order to maximize their use.

Municipal/Community Services

Extension of municipal services such as water and sewer should be planned and implemented to accommodate the servicing of the community as a whole.

Transit and Roads

Roadway networks should be planned to accommodate the anticipated increase in traffic volume while protecting the integrity of residential neighbourhoods. With appropriate widening to four lanes, 144th Street and 72nd Avenue will remain as arterial roads. Major collectors should remain as 76th Avenue and 148th Street. Transit service to the area needs to be improved.

A modified grid street pattern is suggested for local roads to promote a sense of place and community. The LAP Roadway Plan proposes a crescent shaped local road connecting 144th Street, at the 74th Avenue right-of-way, and 76th Avenue around the school/park site.

Future alignment of the proposed Bear Creek Connector by the Province should have input from the Municipality to ensure impact on adjacent residential neighbourhoods is minimized and adequate buffering is provided to minimize visual and noise impact.

Housing

Design of houses should be controlled to avoid the problems associated with "mega houses".

Urban/Suburban Boundary along 149A Street

The northerly neighbourhood is envisioned to be a combined urban and suburban community with an appropriate gradation of residential density towards the edge of the area bordering agricultural land. A transition between Urban and Suburban is needed.

The LAP proposes protection for the existing Chimney Hill half-acre suburban residential neighbourhood by expanding the suburban boundary westward to provide two rows of half-acre suburban residential lots.

5. Neighbourhood Concept Plan

5.1 Overall Development Concept/Land Use Pattern

The Land Use Plan for the neighbourhood is shown as Figure 5.1.1. The pattern of land uses, roads and subdivision has been derived from the Local Area Plan, and input from owner/public meetings. The plan corresponds with the LAP objectives for a variety of housing types, protection of the Bear Creek natural environment, a school/park site as the neighbourhood focus and a road and walkway system that provides safe and easy movement through the neighbourhood.

The plan provides a variety of lot sizes and housing types from low to medium densities to meet the needs of diverse residents and to achieve a balanced and integrated social structure. Consistent with the LAP, the area is predominantly urban single-family residential with a component of cluster housing in the form of small lots surrounding the neighbourhood park/school site. A medium density residential area in the form of townhouses is located at the southwestern edge of the neighbourhood. Single family lots back onto this area to correspond to the existing single family area along 145th Street. The plan has recognized the need to integrate and accommodate the new lots within the existing single family structure.

The proposed school and adjacent active parkland will provide the focal point for the area. The layout of the main local roads and T-intersection at the school/park site supports the visual and social importance of this site. Not having 74th Avenue a continuous Limited Collector road reflects the wishes of the community.

A linear open space, connecting with the walkway at the eastern boundary, links the existing neighbourhood to the proposed school/park site and continues to link with the Bear Creek preservation area. Other pedestrian/

linear greenways between residential enclaves accommodate movement to parks, schools, community facilities and transit stops.

A substantial amount of parkland is provided to preserve the environmentally sensitive Bear Creek area. Gross density has been applied to the residential area along the eastern bank of Bear Creek to further land preservation. The detention pond has been designed as a wet pond and has been sited to have a minimal environmental impact.

The plan put forward reflects the accuracy of our information at this time. Adjustments and refinements may be made to sub areas during the development application stage. Figures 5.1.2 and 5.1.3, which follow, show the proposed zoning and Official Community Plan (OCP) revisions.

5.2 Housing Types

5.2.1 Single Family Residential

Standard

Urban single family lots are proposed as the primary form of land use. These are defined by the City of Surrey as having an area of 560 m², and a street frontage of not less than 15 metres and a minimum lot depth of 28 metres. This form of housing will cover approximately 81.1 hectares (200.5 acres). The LAP proposed density of 14.8 units per hectare (6 units per acre) is a high estimate using 560 m² lots. A yield of approximately 12.4 units per hectare (5 units per acre) is attainable except in areas with existing houses where the yield tends to be a little less.

Large Lots with Covenant

As a transition between urban and suburban, larger than standard urban single family lots are proposed. The lots are a minimum of 1068 m² (11,500 ft²) with a range from approximately 20 to 28 metres in width and approximately 34 to 48 metres in depth. The minimum lot depth of 34 metres provides for a 28 metre building lot plus an additional 6 metre covenant area for tree retention. The covenant area is to ensure the retention of existing vegetation and to provide visual screening with the use of additional planting when existing vegetation warrants it. These lots will cover approximately 4.1 hectares (10.1 acres).

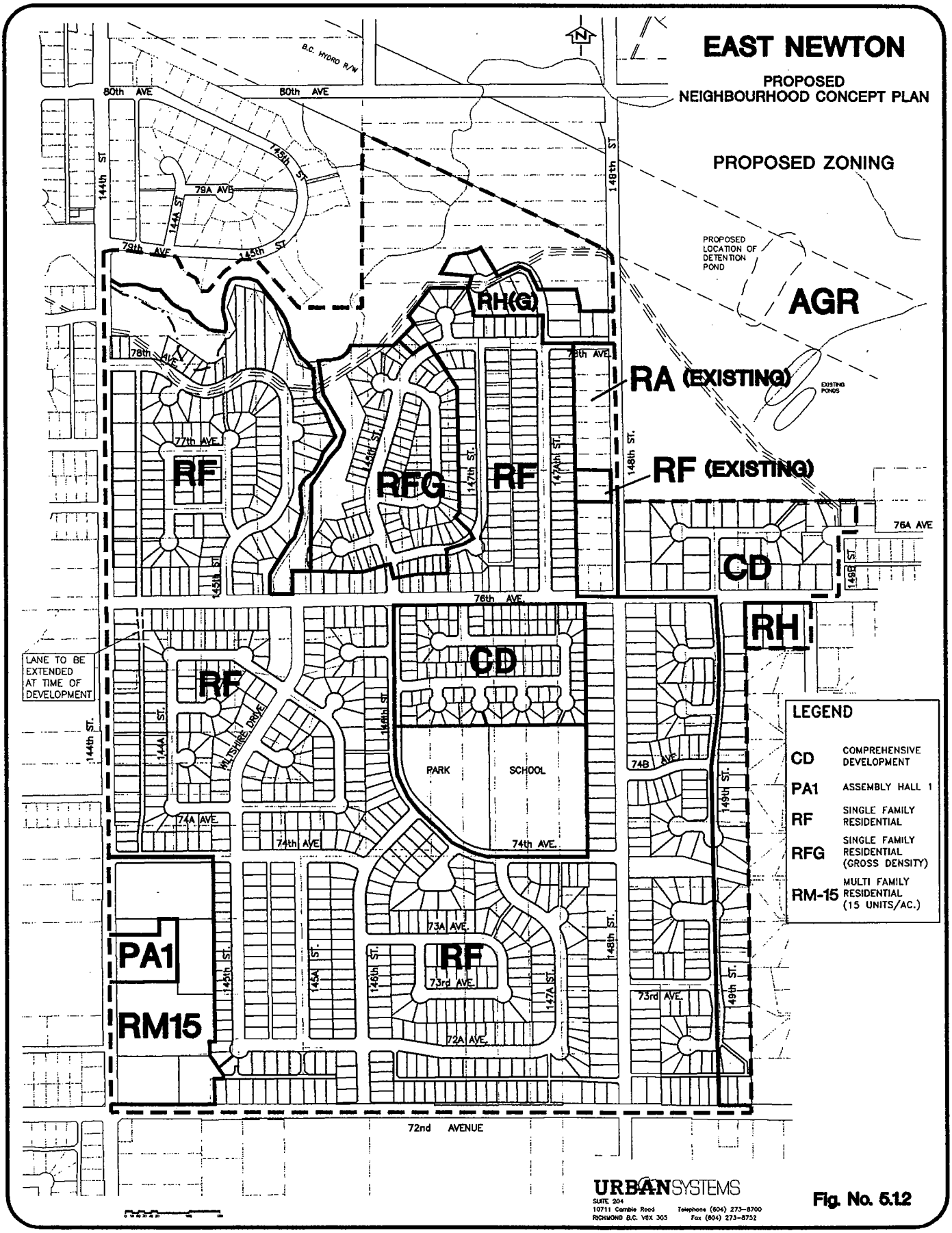

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Fig. No. 5.12

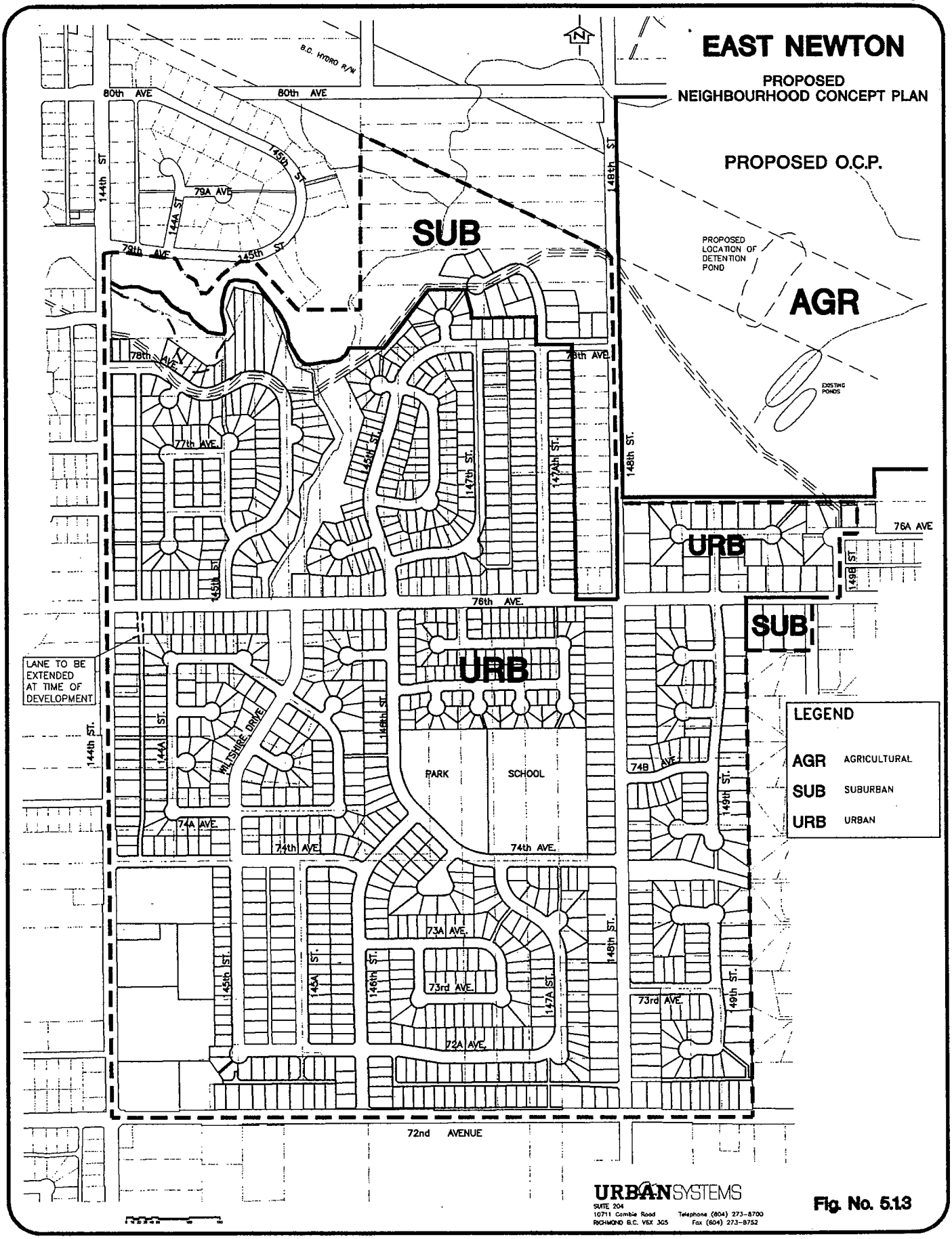
EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
PROPOSED O.C.P.
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
AGR
SUB
URB
B.C. HYDRO R/W
80th AVE
144th ST
145th ST
144A ST
79A AVE
79th AVE
78th AVE
77th AVE
145A ST
147th ST
147A ST
148th ST
76A AVE
149B ST
76th AVE.
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144A ST.
WILTSHIRE DRIVE
146th ST.
PARK
SCHOOL
74B AVE.
149th ST.
74A AVE.
74th AVE.
73A AVE.
145th ST.
145A ST.
146th ST.
73rd AVE.
147A ST.
72A AVE.
72nd AVENUE
LEGEND
AGR AGRICULTURAL
SUB SUBURBAN
URB URBAN
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Fig. No. 5.1.3

Gross Density

A major natural features, such as Bear Creek and the unnamed tributary, should be preserved and incorporated into development through the application of gross density zoning. This zoning is proposed for a portion of the urban single family area along the south eastern edge of Bear Creek. Defined by the City of Surrey, the lot size has a minimum area of 370 m², a street frontage of not less than 12 metres and a minimum lot depth of 28 metres. The size of the lots in the proposed plan are a range of 400 m² to 460 m² minimum. Gross density type zoning may also be applied to the suburban area in A2, north of 78th, in order to preserve Bear Creek. The present layout for area A1 does not include adjustments for gross density averaging.

5.2.2 Single Family Cluster Areas

Adjacent to and in close proximity to the school/park site affordable housing has been incorporated in the form of small single family lots. The layout respects the predominantly standard single family area by creating internal pockets. This locates the transition between land uses at adjoining rear property lines. The maximum density allowable is 24.7 units per hectare (10 units per acre). The plan proposes 22.2 units per hectare (9 units per acre) with a lot size of 370 m² with a street frontage of 12 metres. These lots will cover approximately 5.1 hectares (12.6 acres).

5.2.3 Multi-Family Residential

Responding to the LAP, the medium density residential use is located along the site's southwestern edge at 72nd Avenue and 144th Street. The form of housing proposed is townhouses. This multi-family area has been extended slightly to include some of the land behind the Baptist Church property. A row of single family residential lots back onto the multi-family area to provide a complimentary frontage to the existing single family residential area along 145th Street. The multi-family area will have a maximum density of 37.1 units per hectare (15 units per acre) and will cover approximately 5.1 hectares (12.6 acres).

5.3 Roads

The arterial roads of 144th Street and 72nd Avenue form the western and southern boundaries of the study area. Individual lot access to these roads will not be permitted in order to ease the movement of through traffic. Houses fronting these arterial roads will be provided with lanes instead of frontage roads.

76th Avenue and 148th Street will remain as major collectors. Proposed local roads support the overall road hierarchy and the LAP's desire to have the school/park site as the neighbourhood focus.

The main vehicular circulation within the neighbourhood will be an internal road (146th Street) between 144th and 148th running north-northeast to join a crescent-shaped road around the school/park site. This road configuration, with accesses from 76th Avenue and 148th Street, will provide direct access to the school/park site without 74th Avenue becoming a through road. These roads will provide good access to the surrounding major collector and arterial roads without encouraging undue amounts of through traffic within the neighbourhood.

5.4 Transit

Existing transit service is provided by Route #334 - Newton Exchange/Guildford Exchange. This travels along 144th Street, providing 60 minute frequency of service. It is appropriate that the multi-family housing is located on this route. Regarding future service, BC Transit Staff have indicated that with increasing development, the frequency of transit service to this area might improve. A new route might take the form of a loop around the north and south neighbourhood, travelling to the Newton Exchange.

5.5 Open Space and Pedestrian Pathway

The proposed plan provides a substantial amount of parkland to preserve the environmentally sensitive and significant Bear Creek area. The northern limit of development will respect the environmental setbacks. At present, the setback limits follow the recommendations made in

Envirowest's report with a 15 metre setback from the top of the Bear Creek bank, or from the 100 year flood level of Bear Creek, where the top of the bank is not clearly defined. A setback of 15 metres from the top of bank for the tributary is required.

A linear open space system has been developed to encourage pedestrian and bicycle movement throughout the development. The proposed routings for walkways is shown in Figure 7.1.2.2. Road and pedestrian paths have been coordinated to provide logical access to the school and park site. A walkway connects with the existing pedestrian path system east of 149th Street providing access to the school/park and the passive park area of Bear Creek. A number of smaller pedestrian connections are proposed, providing access to transit stops from internal streets. All multi-use walkways will consist of 4.0 m minimum width walkways within 5.0 m minimum rights-of-way.

5.6 Elementary School/Neighbourhood Park

The school/park site is located to reflect the LAP's proviso that this facility provide a central neighbourhood focus. The proposed joint school/park site is approximately 5.3 hectares (13.1 acres) which accommodates the 2.2 hectares (5.4 acre) park requirement and a 3.1 hectare (7.70 acre) school site. Acquisition of the property will be through a 4.0 hectares (9.9 acre) land exchange between the current owner of the proposed school site and the School Board/Parks and Recreation Department with the balance of the land contributed through the current owners 5% parkland dedication. The school/park will provide active recreational opportunities. (Figure 5.6.1)

To avoid conflict with traffic entering 74th Avenue from the single family development to the south, the access to the school/park parking area should be opposite to the 147th Street intersection. The school drop off area access must be one way as depicted in Figure 5.6.1 so as to minimize the likelihood of conflicts between school traffic and through traffic on 74th Avenue.

The linear park strip in Area D, east of 148 Street would be acquired by the City as part of the 5% park dedication during the subdivision/rezoning process.

EAST NEWTON

PROPOSED NEIGHBOURHOOD CONCEPT PLAN

SCHEMATIC SCHOOL/PARK LAYOUT

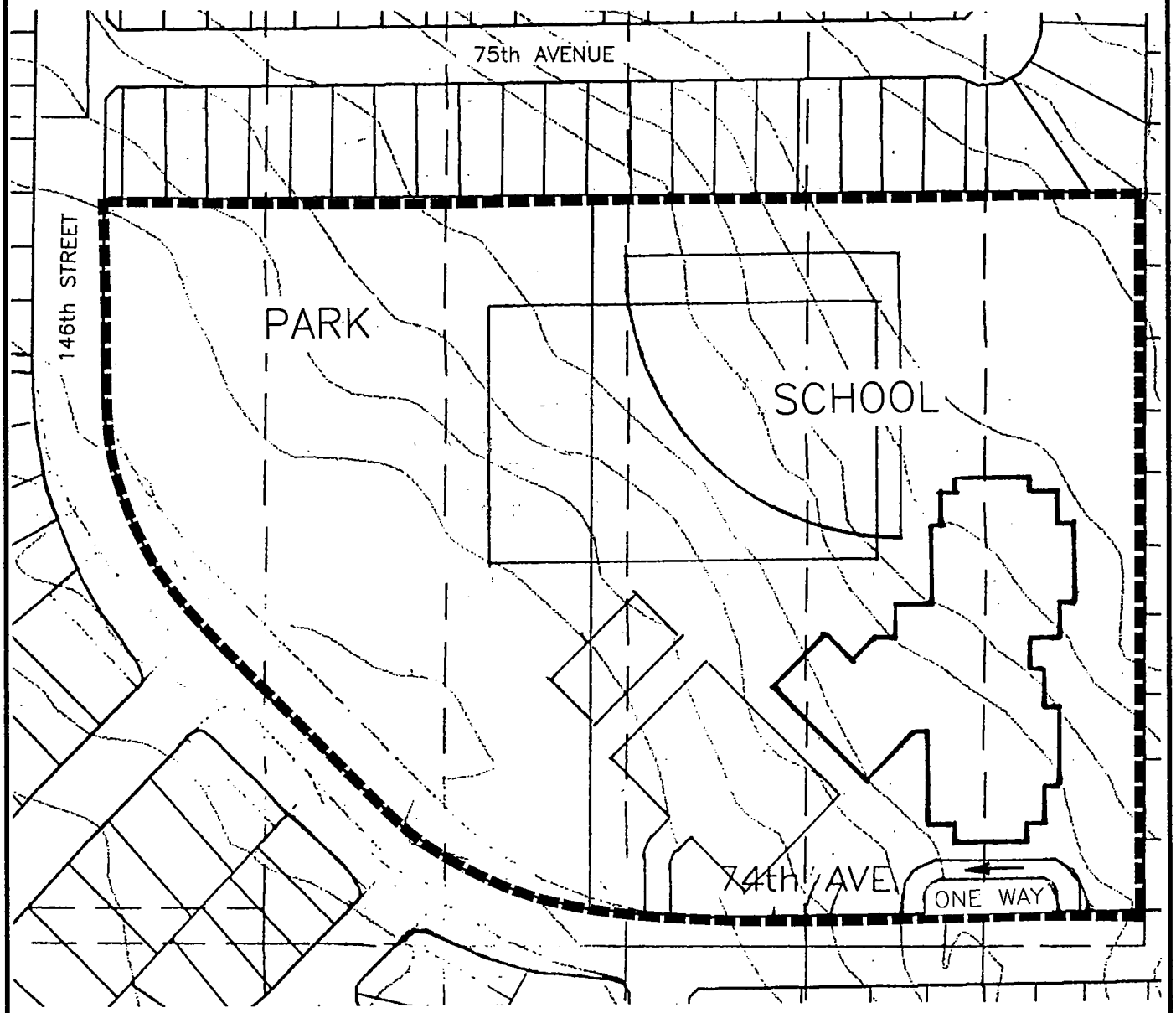

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Fig. No. 5.6.1

5.7 Suburban/Urban Transition

Rationale

The NCP supports the planning principle of buffering the change in land use from the existing Chimney Hill half-acre suburban residential neighbourhood to urban single family. The transition between land-uses may be handled in one of two ways. One approach is to protect existing uses by introducing the same land use on the bordering property and having the change occur within the new development. The LAP has taken this approach by proposing two rows of half-acre suburban lots within the study area along the eastern boundary to separate urban single family from the existing half-acre suburban neighbourhood. This scheme, however, proved to be unpopular with the residents of the NCP neighbourhood, particularly those directly impacted by the low density.

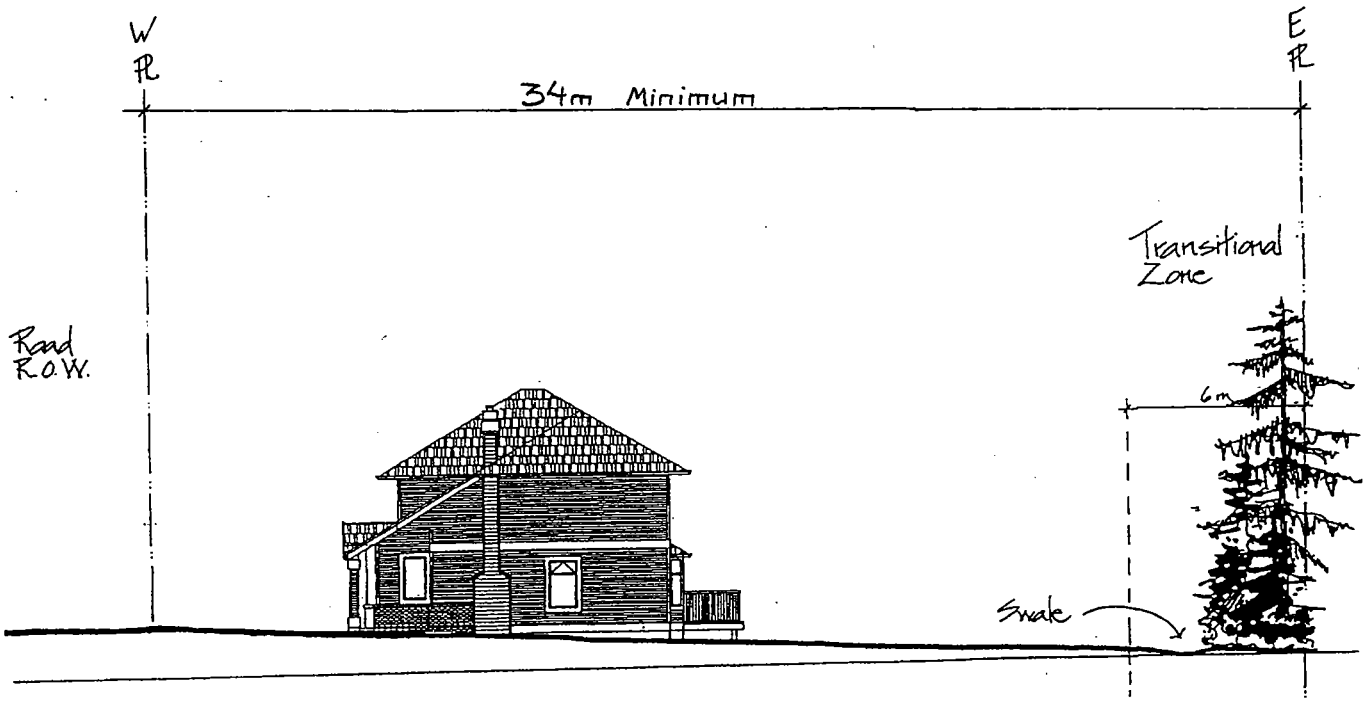
An equally valid approach, since the transition occurs at the rear of the existing properties, is to preserve and/or introduce a landscape buffer to visually screen the change in land use. The NCP proposes that the transition between urban and suburban should occur at the adjoining rear property lines along the entire eastern boundary of the NCP. The plan provides a good visual transition between urban and suburban uses with the provision of large lots 1,068 m² (11,500 ft²) which includes a tree protection covenant zone of six (6) metres adjacent to the boundary. In a worst case scenario, where residentially zoned land adjoins an industrial park zone, Surrey's Bylaw requires an uninterrupted buffer strip of natural landscaping of mature trees not less than ten (10) metres wide. The 6 metre tree protection covenant plus the 7.5 metre building setback will provide a 13.5 metre buffer between residential areas (see Figure 5.7.1). The large lots extend around the northeast perimeter of the study area providing a consistent and strong transition. Through design guidelines and a dominant covenant, the issues of mega houses and secondary suites will also be controlled.

The suburban transition for the portion of Area D north of 76 Avenue will similarly be accommodated by 1068 m² (11,500 ft²) lots adjacent to the Guildford Golf Course. The remaining suburban transition area around the north east area of the NCP will be accommodated by suburban gross density lots at a density of 2 units per acre, and by some existing suburban lots (which contain existing homes) at varying sizes.

EAST NEWTON

PROPOSED
NEIGHBOURHOOD CONCEPT PLAN

SECTION - PROPOSED LOT ADJACENT TO CHIMMNEY HILL



Section – Typical Lot Adjacent to Chimney Hill

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Fig. No. 5.7.1

Implications

One question which arises is whether the above change increases the neighbourhood population and therefore increases pressure on the proposed elementary school. The LAP proposes approximately 1,576 units and a projected population of 4,817 persons for the study area. The NCP has 1,458 units, which includes existing as well as proposed (1,241), and a projected population of 4,277 persons. Despite the increase in density in some areas, the overall density of the study area is lower than the LAP proposes. This is largely because the density in the urban single family areas, which is the dominant form of development, is lower in the NCP than proposed in the LAP. Therefore, the proposed increase in density in Area D will have no implications on school and park requirements or on servicing.

5.8 Community Facilities and Services

It is the City of Surrey's intention to request financial contribution to these amenities as the neighbourhood develops. As part of the rezoning requirements, individual landowners will be required to contribute to these amenities based on the number of dwelling units which the respective properties will yield.

The cost estimates provided by the City of Surrey Planning Department are:

Amenity Item	Cost per Unit	Projected Revenue (Based on 1,241 units)
Police	$ 50	$62,050
Fire	$216	$268,056
Library	$112.50	$139,612.50
Parks Development	$526	$652,600

The details of the City of Surrey's Amenity Study are included in Appendix 7. The Park Development cost per unit is based on, 1,241 units and a capital cost of $652,600. The capital cost represents contributions to the joint school/park site, neighbourhood park and walkways. The joint site is envisioned by the Parks Department to include a soccer field and ball diamond. The neighbourhood park is suggested to include a playground

facility, benches and tables. The final design of the parks will be the responsibility of the Surrey Parks Department.

5.9 Landscape Buffer Strip

The Local Area Plan indicated a requirement for "a properly designed and landscaped buffer strip" along 72nd Avenue to minimize visual and noise impact on adjacent land uses. The Steering Committee and owners of affected properties have carefully considered this requirement and believe that only a solid earth berm or sound suppression fencing would satisfy the same requirement. The City of Surrey has stated that it will require identical buffers for both this NCP area and the East Newton South NCP area.

As the result may be unsightly and out of character with the area and would seem to contradict other Surrey policies, the proposed single family lots fronting 72nd Avenue will be deepened to provide a greater setback and room for the required planting. These options will be further examined at the application stage and dealt with on a lot by lot basis.

5.10 Affordable Housing

Although specific sites have not been identified for special needs or affordable housing, it is acknowledged that these uses may be accommodated under the multi-family and compact housing components where relatively less expensive forms of housing may be situated.

5.11 Land Use and Population Statistics

For the preceding development types, the following population is projected for the study area:

	UNITS	PERSONS
Urban Single Family	1,184.0	3,789.0
Single Family (Compact Lots)	88.0	282.0
Multi-Family	186.0	298.0
TOTAL	1,458.0	4,369.0

Note: Urban single family and cluster 3.2 persons per household. Medium density multi-family 1.6 persons per household. (Figures taken from Appendix 1 of the East Newton LAP)

5.12 Comparison of LAP and NCP Land Use Patterns

LAP Land Use Projections

The Local Area Plan projected the following land uses and area allocations:

LAND USE	AREA		UNITS
Suburban	24.89	(61.5)	123
Urban Single Family	81.75	(202.0)	1,212
Compact Single Family	4.05	(10.0)	100
Multi-Family	3.80	(9.4)	141
School	2.43	(6.0)	0
Active Park	3.04	(7.5)	0
Passive Park	13.96	(34.5)	0
TOTAL	133.92 ha	(330.9) ac	1,576

NCP Land Use Projections

Based on the NCP the following proportion of land uses is anticipated in the subject site area:

LAND USE	AREA		UNITS
Urban Single Family (1,068 m²)	14.57	(36.0)	104
Urban Single Family	80.41	(198.7)	985
Single Family Gross Density	7.49	(18.5)	97
Compact Single Family	5.10	(12.6)	88
Multi-Family	5.10	(12.6)	189
School	2.47	(6.1)	0
Institutional	0.81	(2.0)	0
Active Park	3.04	(7.5)	0
Passive Park	14.93	(36.9)	0
TOTAL	133.92 ha	(330.9) ac	1,462

6. Development Guidelines/ Considerations

6.1 General Guidelines

The predominant development form will be single family homes which will for the most part be regulated by the RF Single Family Residential-Zone. Around the school, some small lots are provided to improve the availability of more affordable Single Family homes and increase the mixture of housing types. Some urban gross density (RF-G) type lots are proposed in the north area adjacent to the Bear Creek corridor.

The ability to regulate single family housing design and siting is limited through the zoning process.

6.2 Architectural Building Controls

Regulating architectural design and siting is considered very important to the implementation of this plan. Building design guidelines which prescribe a minimum architectural standard will be required for each single family development approval in accordance with Surrey's new Building Scheme Process which requires the developer to submit the "Detailed Model Housing Design Guidelines" which are included in Appendix 3. The Steering Committee recommends adopting the Genstar Design Guidelines for the neighbourhood area similar to the Boundary Park Development in Surrey. Typical guidelines used by Genstar are included in Appendix 3.

It is intended that townhouse development should be architecturally (see Appendix 3) compatible with predominant single family housing forms in the neighbourhood. In this respect, application of single family housing guidelines adapted to multiple family projects is suggested. The following general design objectives are suggested for townhouse development:

- Achieve High Quality Design.

- Reduce visual and physical dominance of the automobile.
- Provide for reasonable pedestrian circulation and shared open space.
- Provide for individual unit privacy and open space.
- Provide a good quality of landscape at development completion.
- Consider external street orientation as appropriate.

In general, layouts may give preference to the following design attributes:

- Avoidance of narrow, monotonous "garage door" streetscapes.
- Roofscapes which provide visual interest through variation of pitched roof forms.
- Building forms which avoid excessive, unbroken lengths of wall. Duplex, triplex and fourplex forms are preferred.
- Consistent application of materials, trim and colours on all building facades.
- Landscaping should be used on internal streets to "soften" the visual appearance of paved areas and building facades.
- Private outdoor areas should be delineated from shared public areas by fencing and/or landscaping.
- Formal entrances should be separate from garage areas.

6.3 Secondary Suite Restrictions

Legal secondary suite housing has not been planned for this neighbourhood. Any construction of or conversion to secondary suites must comply with the relevant City of Surrey bylaws at the time of application. This area is not currently or proposed to be zoned for Secondary Suites.

6.4 Tree Preservation

The preservation of trees is an important consideration in the development of this neighbourhood and can add to the visual and natural character of the community.

The preservation of trees on individual properties will be examined and reviewed at the rezoning and subdivision application stage. All City of Surrey Bylaws and policies relevant at such time shall be considered for each application.

6.5 Development Phasing

The major servicing infrastructure required to support the proposed NCP1 land uses exist at the perimeters of the area. Arterial roads at the south and west boundaries provide good access. The trunk water mains within these two arterial road allowances have adequate capacity to meet both domestic and fire demands. A trunk sanitary sewer and the Bear Creek traverse the north boundary of the area providing discharge points for future area sanitary and drainage systems. Sanitary and storm sewers also exist within 76th Avenue just to the east of 148th Street. The storm sewer within 76th Avenue has sufficient capacity to service all of the area south of 76th Avenue. These infrastructure services may be readily extended to provide servicing to any portion of the NCP area.

As stated in the preceding paragraph, access exist to all parcels from 72nd Avenue and 144th Street. Adequate water is available from water mains within both of these road allowances. Storm and sanitary services for all areas other than area A1 must, however, be extended from existing trunks at the northeast corner of the site. Phasing of the area is thus not firmly defined by the servicing infrastructure. The locations of the existing sanitary and storm sewers on 76th Avenue indicate, however, that the most cost-effective progression for development of the area south of 76th Avenue would be from the northeast area, near to 76th Avenue and 148th Street, towards the south and the west as depicted by Figure 6.5.1. Areas A1 and A2, north of 76th Avenue, could develop from the north towards the south as both of these areas have sanitary available at their northern boundaries and Area A1 also has sanitary available to the north. The construction of the community detention pond and the trunk storm

sewer on 148th Street to the pond are critical to the completion of the NCP but do not dictate the phasing. The actual phasing will be dependent upon a number of factors including:

1. The cost of extending the existing services to the area to be developed;
2. Ownership patterns and the size of land holdings;
3. Financial capability of the individual landowners; and
4. Market conditions.

Key to any development in the NCP area is the provision of stormwater detention. Due to the cost of the community detention pond, interim detention facilities will be required in all areas to be built by developers at their cost and remain in place until the community pond is built. Surrey will complete the community ponds as funds are available.

The likely scenario for the development of each of the five NCP1 areas considering all of the influencing factors is presented below:

Sub Area A1

Area A1 could develop at any time since the sanitary sewer trunk main and Bear Creek, to which this area's, storm sewer system will discharge independent of other area's are at the northern boundary and water is available at 144th Street. Interim detention will be necessary if this sub area proceeds prior to the development of Area B to the south of 76th Avenue and the interception of the runoff from that area by the 76th Avenue storm sewer system. This is because both areas A and B presently discharge to the westerly portion of Bear Creek. Once the runoff from Area B is diverted to the east, the increased run off from the development of Area A may be accommodated without detention. Because this area is owned by several owners with no large land holdings, it is anticipated that development of this area will not occur until several stages of areas B and C, where there are fewer or only one owner, are completed. As a consequence the main infrastructure services within the NCP area are likely to be substantially complete before development occurs here.

Sub Area A2

As with Area A1, this area has the sanitary sewer trunk and Bear Creek at the north boundary. As with all other areas, interim detention will be necessary if this sub area proceeds prior to the completion of the community pond. Although storm and sanitary are readily available, the water must be extended from either 72nd Avenue or from 144th Street. Since the land ownership is also similar to Area A1 development is not likely to occur in this area until later in the development of the overall NCP area.

Sub Area B

Although this area consists of several land holdings, the owners are represented by a developer and have expressed an eagerness to proceed with development. A portion of this area will therefore likely be the second stage of development within the NCP area. Once the development of the north portion of Area C is complete this area could be serviced by extending the sanitary and storm sewers and the water main along 76th Avenue from Area C. If this area develops prior to completion of the main detention pond and the trunk sewers to it, an interim detention pond will be required. The water main would likely be extended from Area C to the 144th Street trunk main (assuming the Area C has not already constructed this section) thus completing the water main along 76th Avenue from 144th Street to 148th Street.

Sub Area C

This area is likely to be the first to develop as it is a large holding owned by a land development company with the resources to proceed. The area may be serviced by the extension of the water from either 144th Street or 72nd Avenue and the extension of the existing 76th Avenue sanitary and storm sewers from approximately 148th Street. The developer is eager to proceed and it is likely that the water will be extended through this area from 72nd Avenue. It is anticipated that the northern portion of this area will form the initial phase of development within the NCP area.

We anticipate that the development of this area will continue southwards without interruption from an initial phase at 76th Avenue providing the market for single family housing remains strong. It is possible therefore that this area is fully developed before many of the other NCP sub-areas begin to develop.

As with other areas, interim detention ponds will be required within this area until the ultimate pond is constructed.

Sub Area D

The existing sanitary and storm sewers within 76th Avenue are adequate to service Area D. The area is therefore likely to develop from 76th Avenue towards the south once the water is extended to the area along 76th Avenue from 144th Street.

If this area develops prior to completion of the main detention pond, which will serve other areas, an interim detention pond will be required.

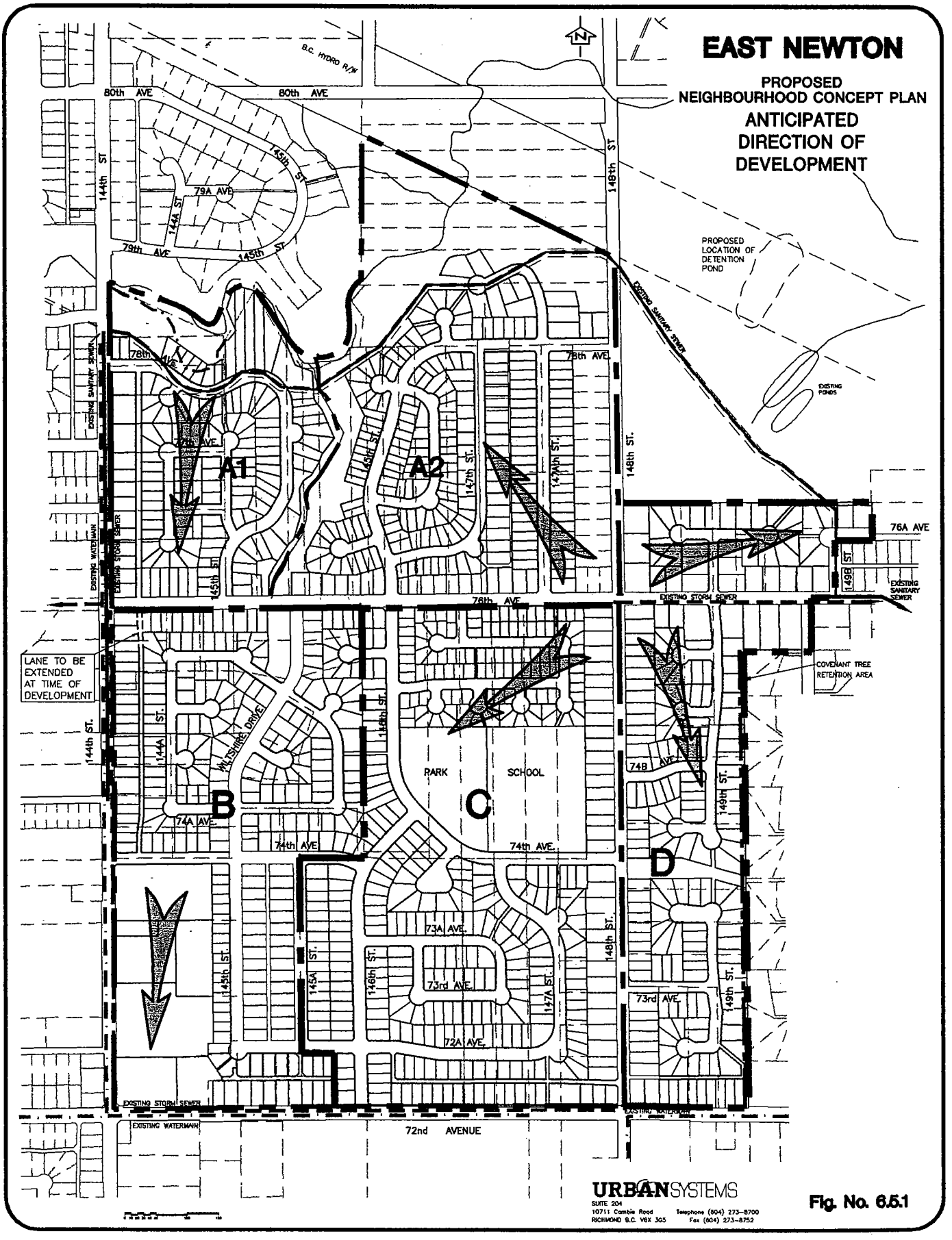
EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
ANTICIPATED
DIRECTION OF
DEVELOPMENT
N
B.C. HYDRO R/W
80th AVE
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
145th ST
148th ST
PROPOSED
LOCATION OF
DETENTION
POND
EXISTING SANITARY SEWER
EXISTING
PONDS
78th AVE
78th AVE
EXISTING SANITARY SEWER
77th AVE
A1
A2
145th ST
147th ST.
147A ST.
148th ST.
76A AVE
149B ST
EXISTING
SANITARY
SEWER
EXISTING WATERMAIN
EXISTING STORM SEWER
76th AVE
EXISTING STORM SEWER
LANE TO BE
EXTENDED
AT TIME OF
DEVELOPMENT
COVENANT TREE
RETENTION AREA
144th ST.
144A ST.
WILTSHIRE DRIVE
148th ST.
PARK
SCHOOL
74B AVE
B
C
D
74A AVE.
74th AVE.
74th AVE.
149th ST.
145th ST.
145A ST.
146th ST.
73A AVE.
148th ST.
73rd AVE.
147A ST.
73rd AVE.
149th ST.
72A AVE.
EXISTING STORM SEWER
EXISTING WATERMAIN
72nd AVENUE
EXISTING WATERMAIN
URBAN SYSTEMS
SUITE 204
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Fig. No. 6.5.1

7. Servicing

The Stage 1 NCP Document, submitted in June 1995, addressed servicing on a preliminary basis. The following section is intended to supplement the information presented in the Stage 1 NCP report. It addresses the provision of the major roads and services for the East Newton NCP area. Concepts for the transportation network, including pedestrian and bike systems, and for the provision of water, sanitary sewer and stormwater drainage systems are provided.

In general, the provision of the road network, water and sanitary sewer systems are straight forward. The stormwater system requires consideration of peak flow attenuation and water quality measures. The East Newton NCP area is primarily an expansion area, where the major grid roads, water and sanitary sewer systems are in place. These services will only need to be upgraded, as in the case of the road system; or extended as in the case of the water and sanitary sewer systems. A comprehensive stormwater drainage report is attached as Appendix 4.

The servicing proposals within this report are only indicative of the general servicing needs and are not in any way deemed to represent detailed or accurate specifications of the subdivision and rezoning needs for this NCP.

7.1 Transportation

7.1.1 Roadway Network

The East Newton Local Area Plan Traffic Impact Study (TIS), completed in June 1995, determined the traffic implications of the proposed East Newton development (both North Neighbourhood and South Neighbourhood). The TIS report identified the roadway and intersection improvements that will be required for the major road network system within the study area by the year 2004. The future traffic volumes for the NCP area were predicted based on land use and future network assumptions as discussed in the TIS report. This transportation review is an extension of the TIS, addressing more of the local area transportation system.

The East Newton North Neighbourhood is well served by the existing arterial roadway network. Figure 7.1.1.1 illustrates the roadway network classifications within and at the perimeter of the NCP area. Both 72nd Avenue and 144th Street are currently two lane arterial roads that define the southern and western boundaries of the proposed neighbourhood. Surrey's 10 Year Servicing Plan indicates that 72nd Avenue will be widened to a four lane urban divided roadway with appropriate turning lanes at major intersections. Although no improvements are identified in the 10 Year Servicing Plan for 144th Street, the East Newton TIS report concluded that 144th Street should be widened to four lanes between 64th Street and 84th Avenue by the year 2004. This improvement is required primarily to accommodate predicted growth in background traffic as opposed to traffic projected for the subject NCP area.

The proposed roadway network within the NCP area includes connections of both major collector and limited collector roadways to the arterial system. All directional movements of traffic will be provided for at each of these intersections, with the exception of the 144th Street and 78th Avenue intersection where movements will be restricted to right-in and right-out only. The cost to construct full movement intersections between the internal NCP roads and the perimeter arterial roads will be the responsibility of the NCP area. These costs may include left turn islands and/or signals. The volume of traffic on the arterial roads will determine when such improvements are required.

The 146th Street and 72nd Avenue intersection will initially permit all-directional movements. The City of Surrey has, however, indicated that the intersection may ultimately be restricted to right-in/right-out movements only when the traffic volumes on 72nd Avenue result in excessive conflicts.

The proposed plan prevents direct access to the single family residential lots fronting 72nd Avenue and 144th Street. Access to these dwelling units will be accommodated through the provision of lanes at the back of the properties.

In order to assess transportation system requirements for the proposed NCP area, traffic volume projections developed for the East Newton TIS were used as a basis from which to develop internal area patterns. The projected 2004 pm peak hour traffic volumes at each of the key intersections within and at the perimeter of the NCP area are illustrated in Figure No. A1 of Appendix 5. The approach and methodology used to develop the projections for the TIS and subject plan are also briefly summarized within the Appendix. A level of service (LOS) analysis at each of the key intersections is used to determine appropriate traffic controls and intersection geometry. The results of this review are summarized in Figure No. 7.1.1.2.

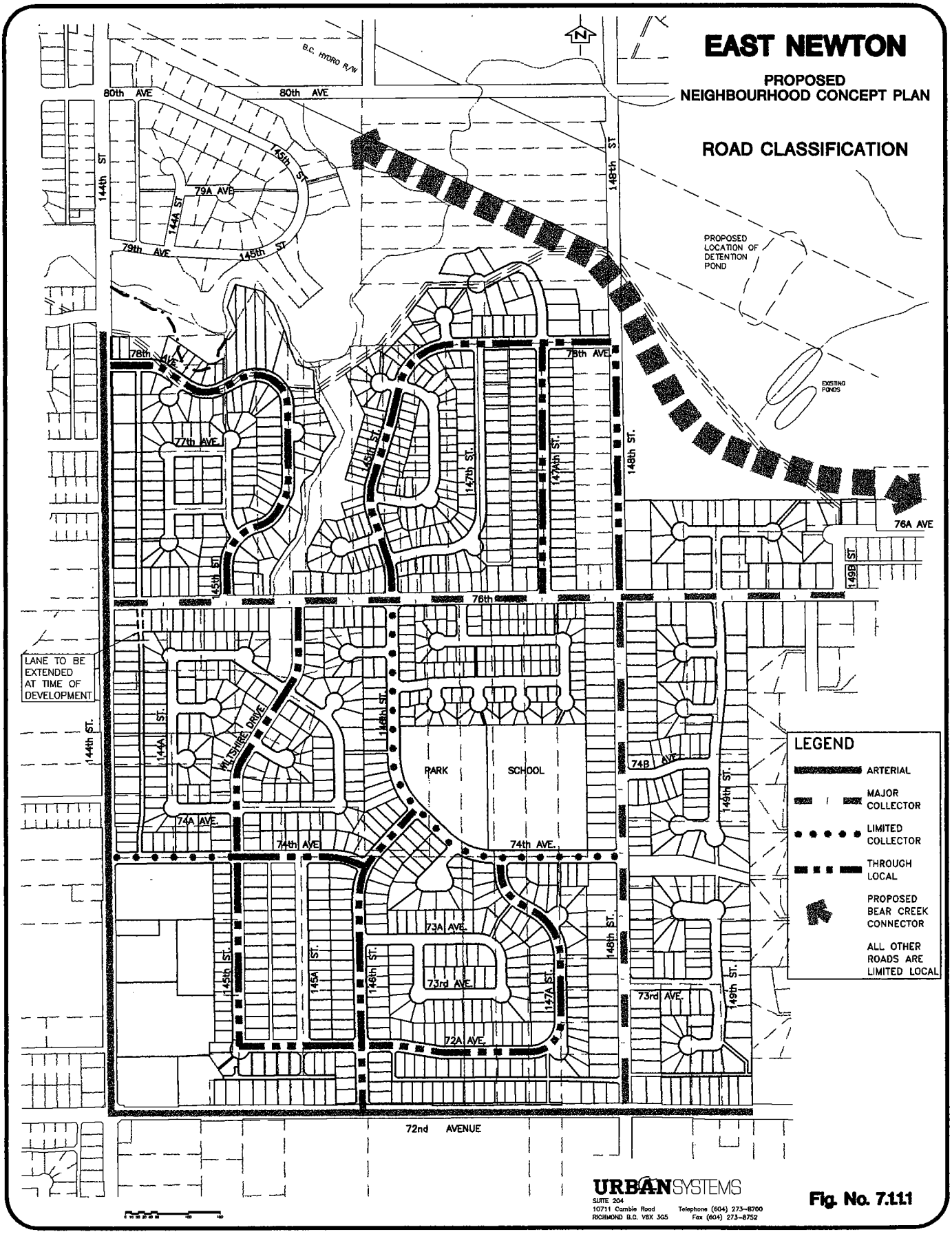

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Fig. No. 7.1.1.1

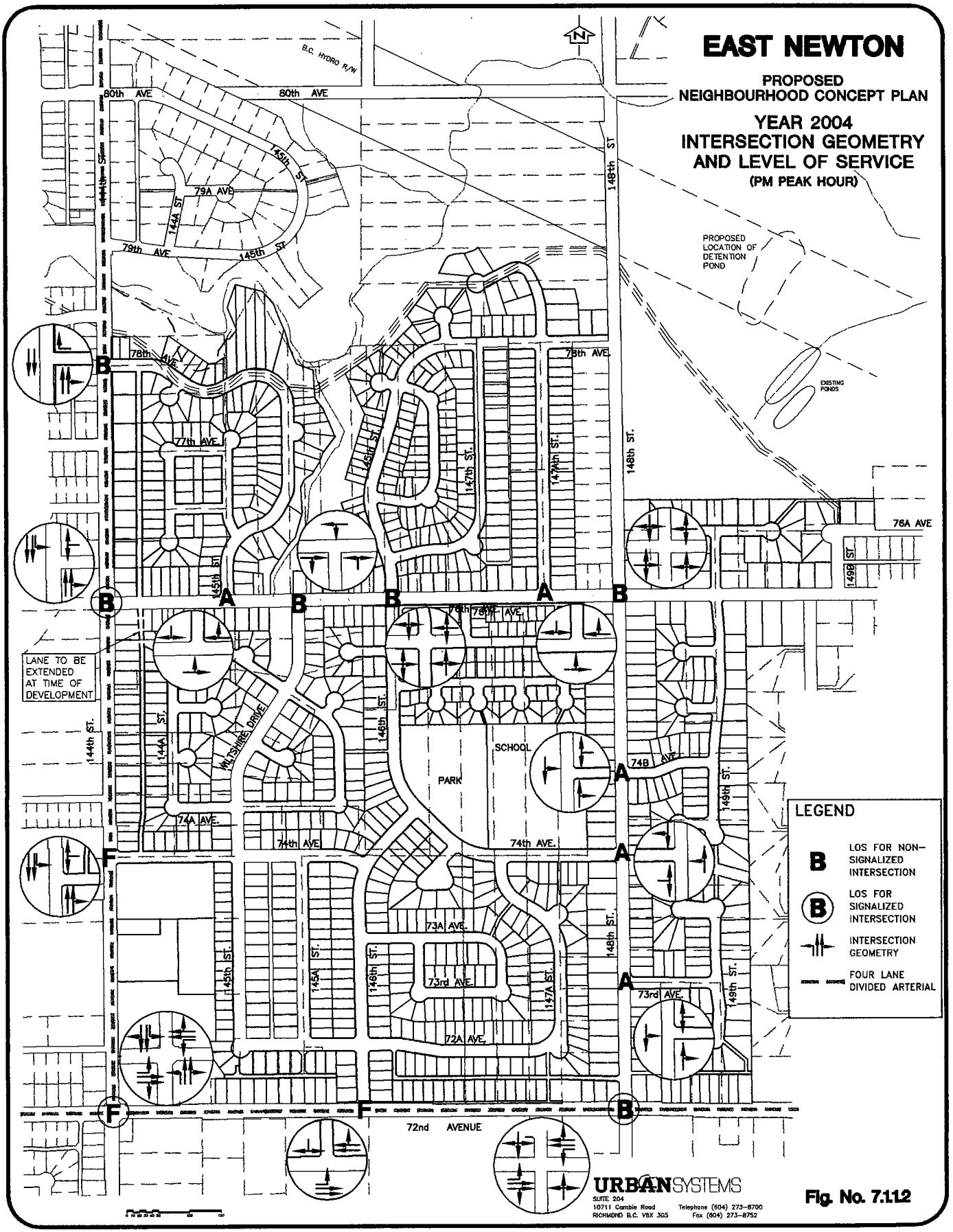

Fig. No. 7.1.2

* LOS 'F' AT UNSIGNALIZED INTERSECTIONS RETAINED AS SIGNALS WOULD NOT BE WARRANTED.
LOS 'F' AT THE SIGNALIZED INTERSECTION NOT RECOMMENDED FOR FUTURE IMPROVEMENT AT CITY'S REQUEST.

144th Street

The projected traffic volumes at the intersection of 76th Avenue and 144th Street indicate that traffic control signals are required.

The intersection of 144th Street and 74th Avenue is projected to operate at level of service (LOS) of F during the peak hour primarily as a result of the delays that would be experienced for the westbound left turning traffic. There is very little that can be done to improve the level of service for this minor approach to an unsignalized intersection. The projected traffic volumes on this minor approach would typically not warrant major expenditures in the form of traffic control signals at this location. It should be noted that this level of service assumes that the gaps in conflicting streams along 144th Street are randomly distributed. In situations such as this where the conflicting flows along 144th Street will be platooned as a result of the upstream and downstream signalized intersections, the availability of gaps will depend on the operation of the signals and turning movements at these intersections. Because of the failing level of service projected for the intersection of 144th Street and 72nd Avenue, it is anticipated that further diversion of background traffic will occur and that estimating signal timing to determine the platooning effect at this time would not produce realistic results. In terms of the geometric conditions, the proposed 74th Avenue connects with 144th Street approximately 70 metres south of the existing west 74A Avenue and 144th Street intersection. This distance is not sufficient to accommodate back-to-back left turn lanes as part of the median area. Area plans for the adjacent land uses west of 144th Street indicate that an additional access/egress is planned immediately north of the existing 74A Avenue cul-de-sac. The intersection of 74A Avenue and 144th Street could subsequently operate as a right-in/right-out connection once the alternative access is created.

As previously indicated, a right-in/right-out connection to 144th Street is proposed at 78th Avenue to serve the NCP area. This intersection is located approximately 78 metres south of existing 78A Avenue which is on the west side of 144th Street. The vertical alignment of 144th Street will provide the recommended sight distances for the safe stopping of 60 km/hr northbound traffic on 144th Street and the recommended decision sight distance for westbound traffic on 78th Avenue turning right onto 144th Street. This connection is slightly off-set with existing intersections along 144th Street to the neighbourhood west of the subject area. The minimal vehicular activity between the NCP area and this west community

is not, however, anticipated to create significant weaving activity along 144th Street. It should be noted that the intersection of 76th Avenue and 144th Street is proposed as the main access to the northwest portion of the NCP area.

72nd Avenue

Connections to 72nd Avenue are proposed for 148th Street and 146th Street. Traffic control signals are recommended for the intersection of 72nd Avenue and 148th Street to accommodate projected traffic volumes. Similar to the unsignalized intersection of 144th Street and 74th Avenue, the intersection of 72nd Avenue and 146th Street is projected to operate at LOS F as a result of the delays projected for the southbound left turn movement. Once again, this assumes a random flow of traffic along 72nd Avenue and does not account for the platooning effect which could create gaps for the minor street volume. However, the anticipated traffic volumes for this approach would typically not warrant the provision of traffic control signals.

Traffic projections for the signalized intersection of 72nd Avenue and 144th Street and the proposed geometry indicate that this intersection will operate at LOS F. Because the improvements to accommodate the projected traffic would require additional right-of-way and since it is anticipated that a significant portion of the projected traffic volumes will be diverted to other roads, the City of Surrey has chosen at this time not to provide for these works.

NCP Roads

As previously indicated, the proposed internal network consists of collector, limited collector, and through local and limited local roadways. The results of the level of service analysis indicate that all key intersections are anticipated to operate above acceptable levels of service using stop conditions on the minor approaches. To reduce potential conflict between the intersection of 74th Avenue and 146th Street and the school, the school parking access and drop-off zones should be located at least 60 m away from the subject intersection. The school parking access/egress should be aligned with one of the two proposed intersections, immediately east of the 74th Avenue and 146th Street intersection. On-street student drop-off zones could be posted on the school side of the roadway, or a one way

parallel lay-by drop-off area could be designed into the school site as depicted by Figure 5.6.1.

The proposed alignment of 145th Street/78th Avenue, extending between 76th Avenue and 144th Street and located west of the major north-south ravine, is strongly influenced by topography, Bear Creek floodplain and land ownership patterns. A number of alternative alignments have been considered by the owners of property in this area. The alignment shown in the NCP is considered to be a reasonable solution to the issues of servicing, access and vehicle circulation. Refinement of this layout may be required at the time of subdivision application due to site specific MELP creek setback requirements.

The proposed roadway cross-sections are illustrated in Figures 7.1.1.3a through Figure 7.1.1.3c. Figures 7.1.1.4 and 7.1.1.5 illustrate proposed on-street parking and intersection controls.

7.1.2 Pedestrian and Cycling Routes

Pedestrian and bicycle networks are recommended within the NCP area to maximize connectivity within and external to the community so as to enhance accessibility to alternative modes of travel.

The proposed major road bicycle network shown in Figure 7.1.2.1 consists primarily of on-road bicycle pathways along 76th Avenue and 148th Street. Surrey's Bicycle Blue print identifies the hydro corridor on the north side of the NCP area as a future recreational multi-use pathway. This route cannot be continued through the Guildford Golf Course until the Bear Creek Connector road right-of-way is available. Thus, the proposed bicycle routes along 76th Avenue and 148th Street will be established as an interim solution and will provide efficient connections to the community via the internal roadway system. Although not shown in Figure 7.1.2.1, all local and minor collector roads are intended as bicycle routes within the NCP area.

In terms of pedestrian systems, the municipal standards for sidewalks on both sides of major collector roadways, one side of limited collectors, and a variation of one and no sidewalks along through local roadways have generally been complied with. Figure 7.1.2.2 illustrates the proposed sidewalk system throughout the NCP area. In general, sidewalks are recommended on streets that are part of a pathway system, provide access to school or other activity centres, or are a long roadways of significant

length. Although not a requirement of the City of Surrey standards, sidewalks have been proposed along most limited local roadways, except where traffic and pedestrian volumes are not anticipated to be significant, particularly along shorter cul-de-sacs. These sidewalks should be constructed adjacent to the curb to accommodate other services within the narrow limited local road right-of-way. The City's subdivision standards stipulate separated sidewalks to permit the planting of boulevard trees between the sidewalks and the roads.

EAST NEWTON

PROPOSED
NEIGHBOURHOOD CONCEPT PLAN

PROPOSED CROSS-SECTION FOR ARTERIAL ROADS

5–LANE ARTERIAL

(72 Ave./144 St.)

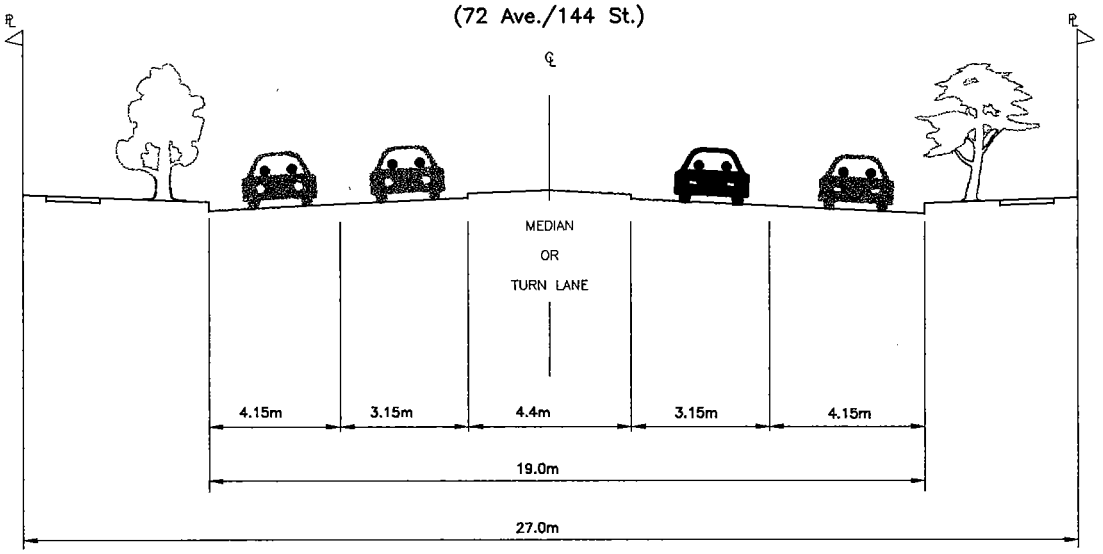

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Fig. No. 7.1.13a

EAST NEWTON

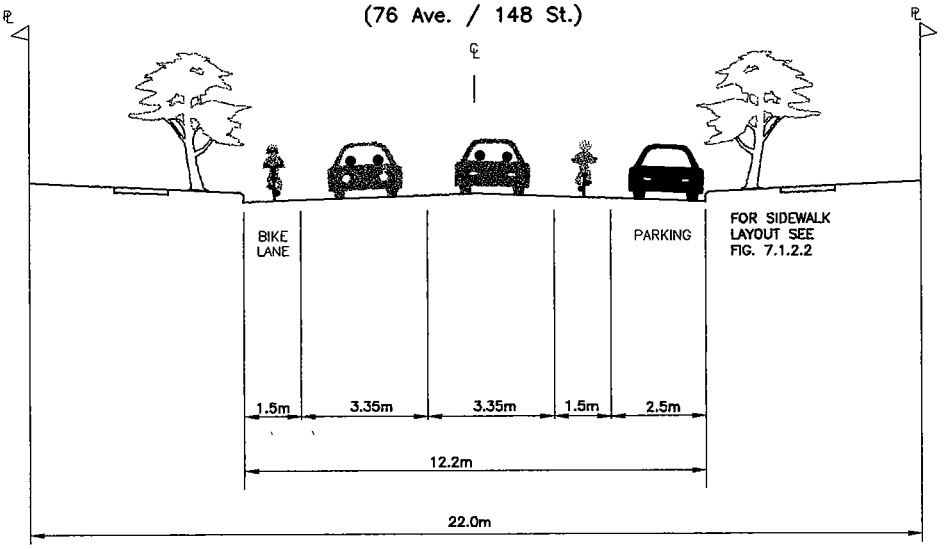
PROPOSED NEIGHBOURHOOD CONCEPT PLAN

PROPOSED CROSS-SECTIONS FOR MAJOR AND LIMITED COLLECTOR ROADS

2–LANE MAJOR COLLECTOR

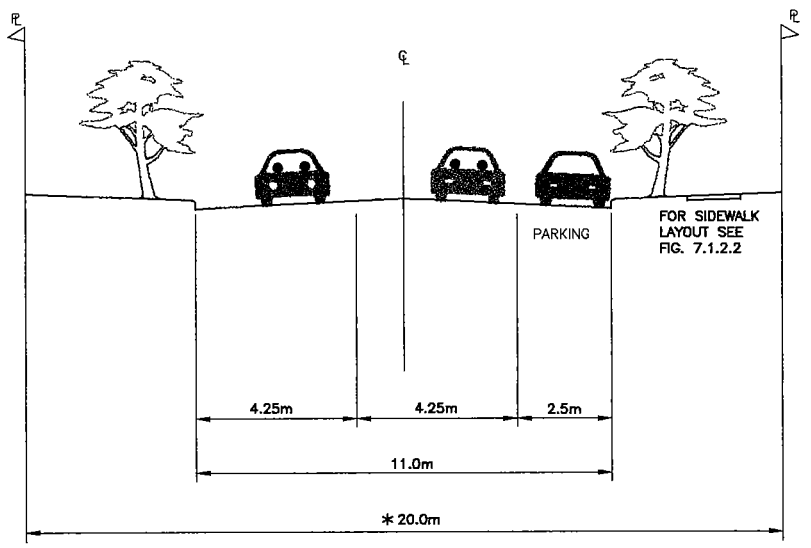
WITH PARKING ON ONE SIDE

(76 Ave. / 148 St.)



2–LANE LIMITED COLLECTOR

WITH PARKING ON ONE SIDE



* The City's "Standard Construction Document" indicates a 22.0m allowance for Limited Collector Roads to accommodate all services. A 20.0m allowance is, however, considered adequate in this instance.

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Fig. No. 7.11.3b

EAST NEWTON

PROPOSED
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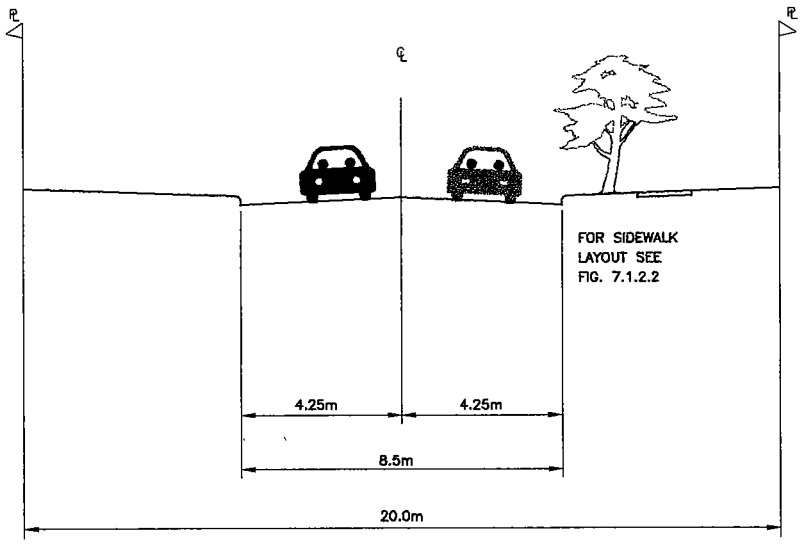
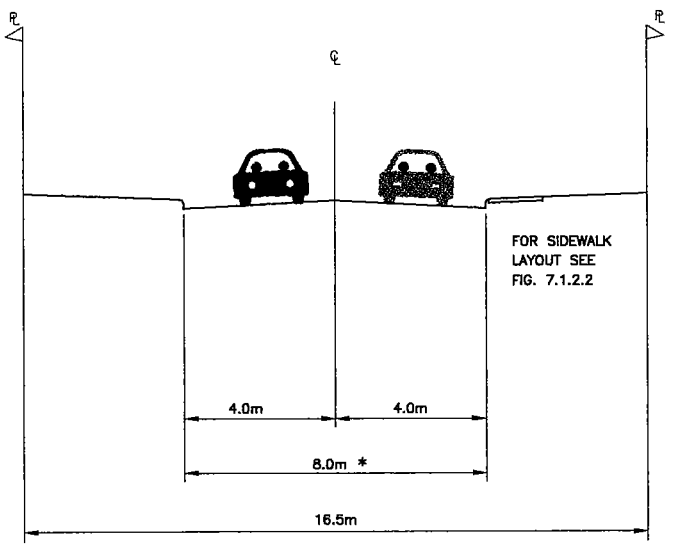
PROPOSED CROSS-SECTIONS FOR LOCAL ROADS

2–LANE THROUGH LOCAL



2–LANE LIMITED LOCAL



* RF–G ZONING REQUIRES 8.5m

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Fig. No. 7.1.13c

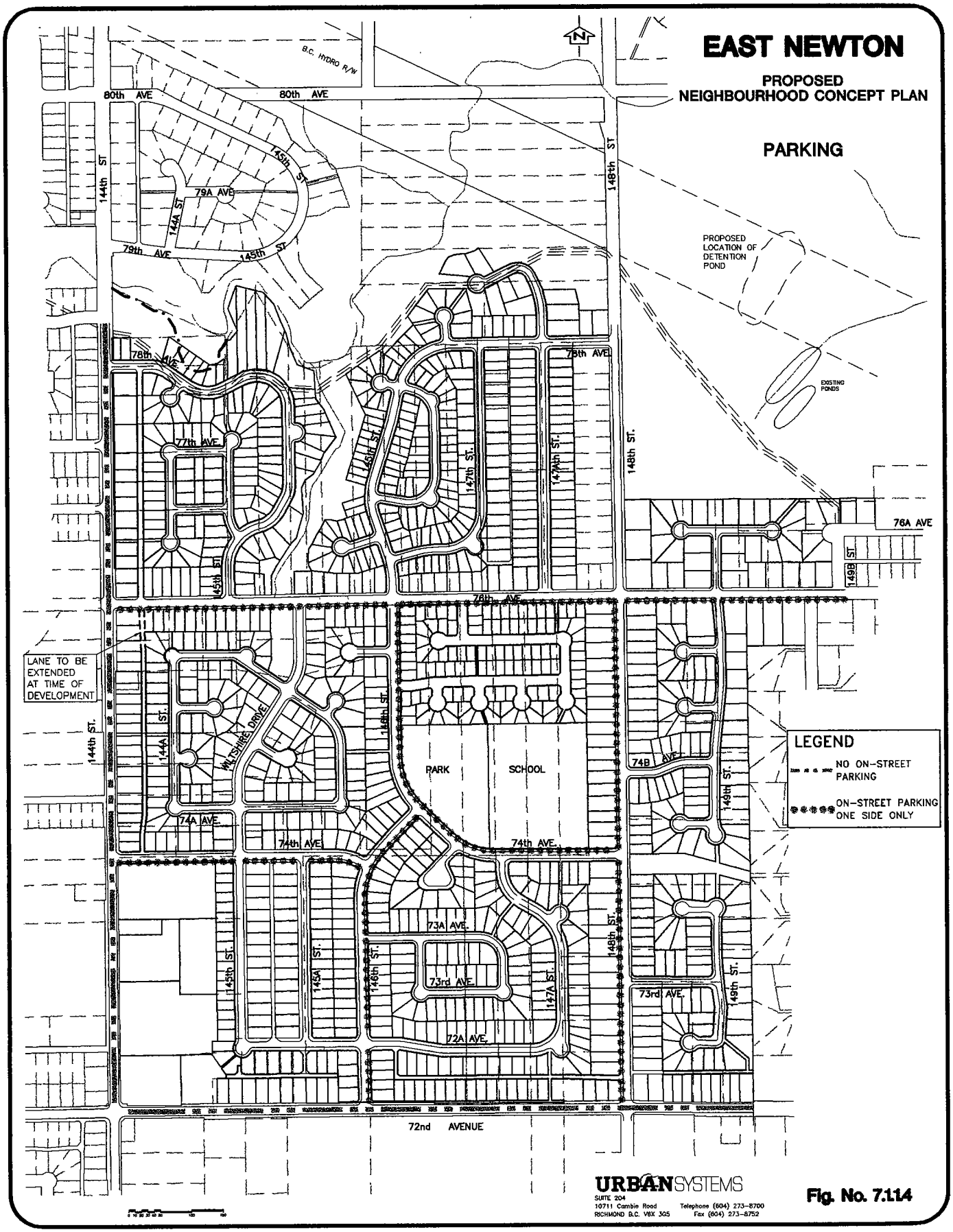

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Fig. No. 7.1.14

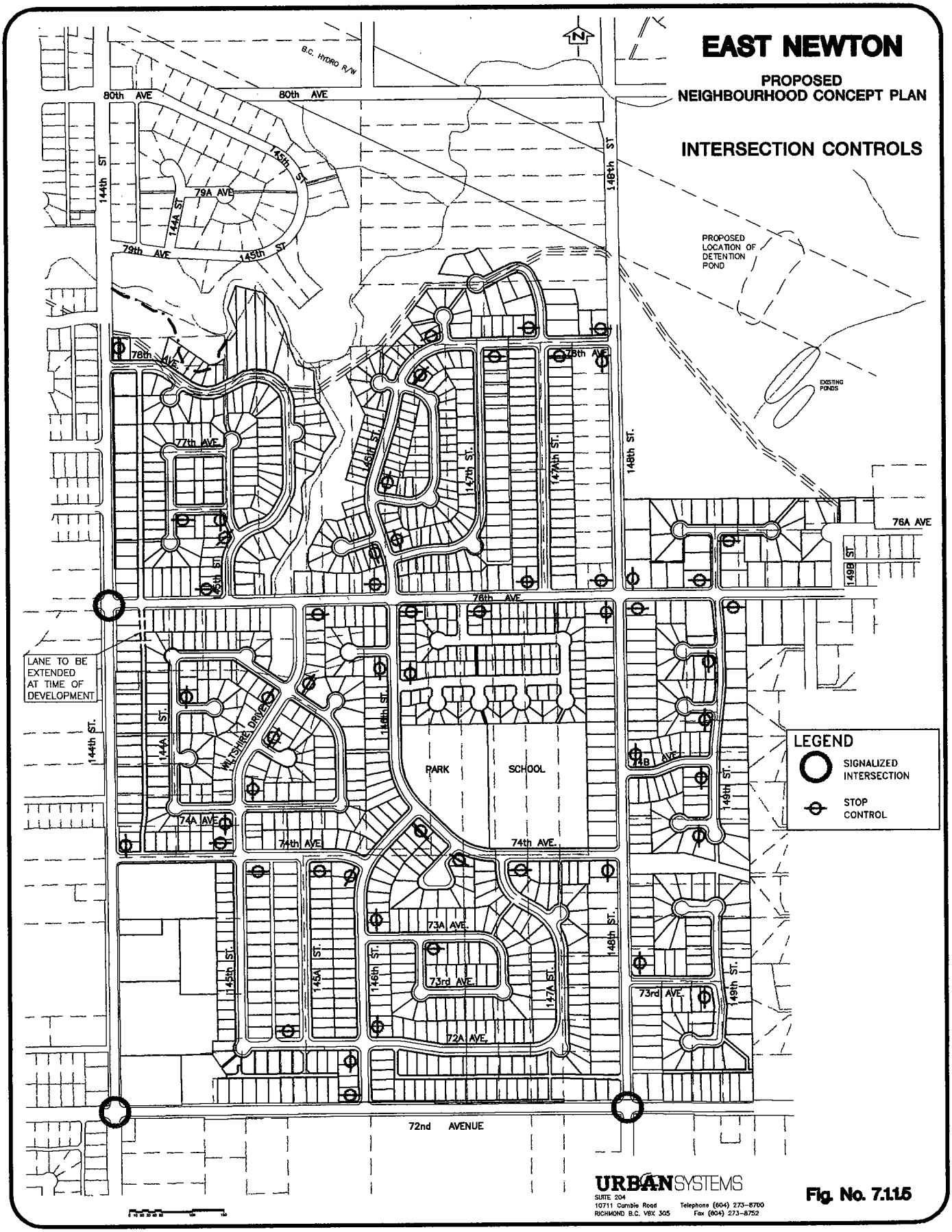
EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
INTERSECTION CONTROLS
B.C. HYDRO R/W
80th AVE
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
145th ST
148th ST
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
78th AVE
78th AVE
77th AVE
145th ST
146th ST
147th ST
147A ST
148th ST.
76A AVE
149B ST
78th AVE
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144th ST.
144A ST.
WILTSHIRE DRIVE
146th ST.
PARK
SCHOOL
74B AVE.
149th ST.
74A AVE
74th AVE
74th AVE.
73A AVE.
145th ST.
145A ST.
146th ST.
73rd AVE.
147A ST.
148th ST.
73rd AVE.
149th ST.
72A AVE.
72nd AVENUE
LEGEND
SIGNALIZED INTERSECTION
STOP CONTROL
URBANSYSTEMS
SUITE 204
10711 Cambie Road
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Fig. No. 7.1.15

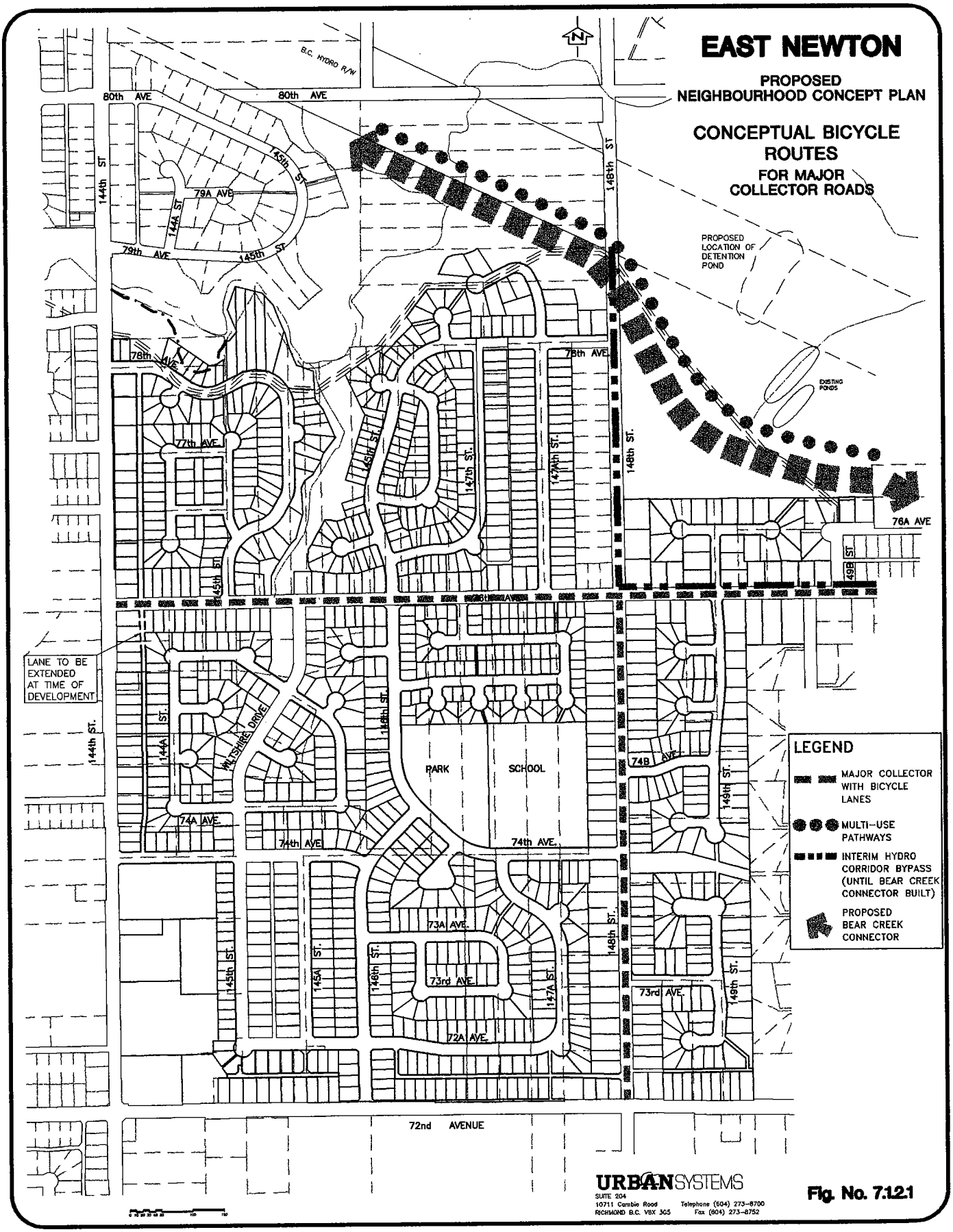

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Fig. No. 7.1.2.1

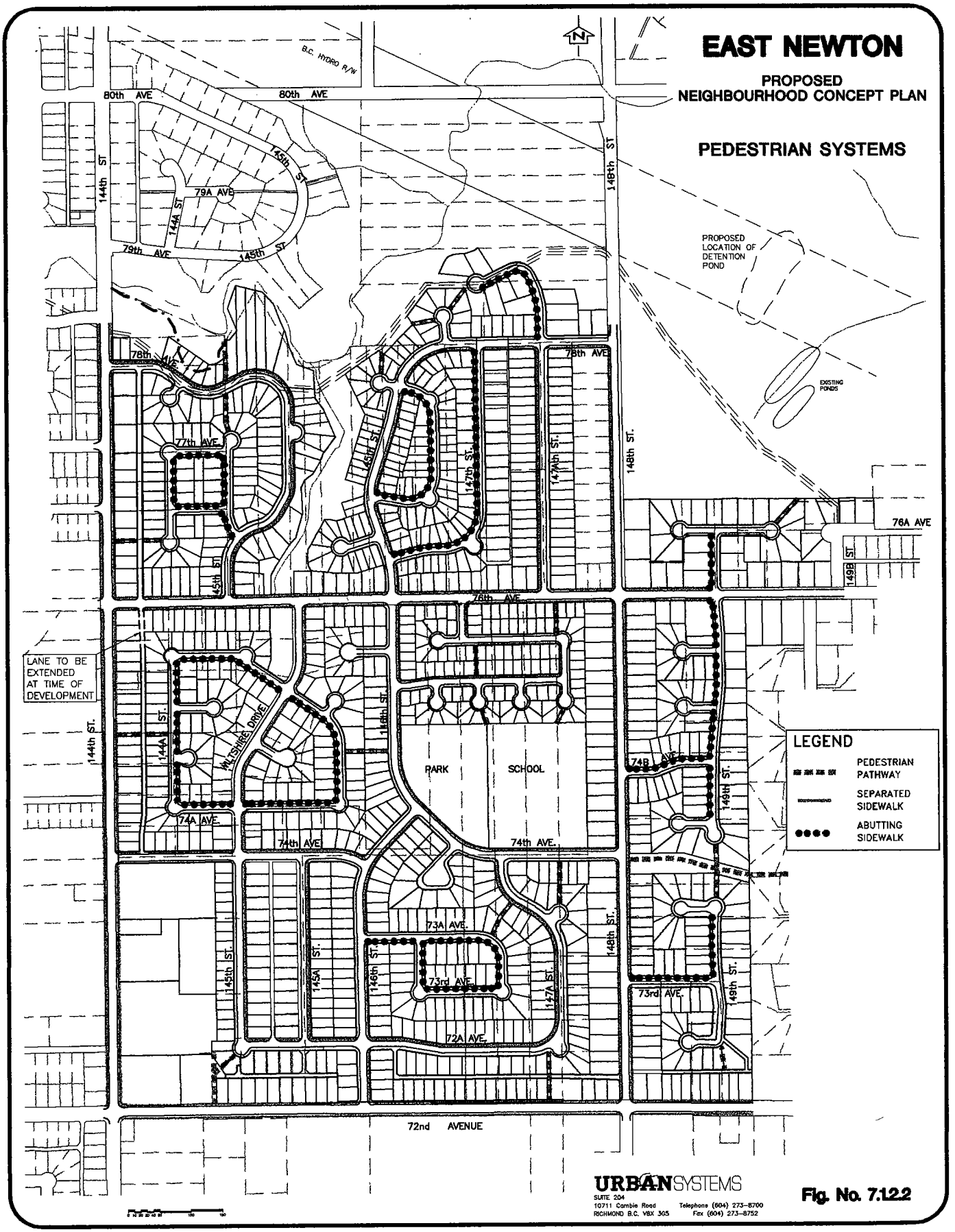
EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
PEDESTRIAN SYSTEMS
B.C. HYDRO R/W
80th AVE
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
145th ST
148th ST
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
78th AVE
78th AVE
77th AVE
145th ST
147th ST
147A ST
148th ST.
76A AVE
149B ST
45th ST
76th AVE
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144th ST.
144A ST.
WILTSHIRE DRIVE
146th ST.
PARK
SCHOOL
74B AVE
149th ST.
74A AVE
74th AVE
74th AVE
LEGEND
PEDESTRIAN PATHWAY
SEPARATED SIDEWALK
ABUTTING SIDEWALK
73A AVE
145th ST.
145A ST.
146th ST.
148th ST.
73rd AVE
147A ST.
73rd AVE
149th St.
72A AVE
72nd AVENUE
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Fig. No. 7.12.2

7.1.3 Transit Service

BC Transit currently provides service along 144th Street and partially along 72nd Avenue in the vicinity of the subject lands. Extension of the service along 72nd Avenue to 152nd Street was indicated by BC Transit as a potential route modification to serve anticipated growth along the corridor. The concept plan for the study area indicates that the "maximum walking distance" policy of BC Transit of 450 metres would be exceeded for a significant portion of the planned residential community. An alternative routing strategy to improve transit accessibility within the planned community would be to provide service along 76th Avenue between 144th Street and 152nd Street. This enhancement would move service closer to the majority of residents within the NCP area and would likely attract a larger volume of transit riders. BC Transit has indicated that this service change is not being considered at this time.

7.1.4 Transportation Summary

In summary, the foregoing assessment identifies several improvements to the existing roadway network in the immediate vicinity of the proposed development. Table 7.1.4.1 summarizes the roadway and intersection improvements required to accommodate the proposed development. Of those improvements identified, the widening of 72nd Avenue is the only project now incorporated into Surrey's 10-Year Servicing Plan. Because the widening of 144th Street to a four lane urban divided roadway is required to accommodate the growth in background traffic, it is recommended that this improvement be incorporated within the City's 10-Year Servicing Plan.

Table 7.1.4.1: Summary of Recommended Improvements

Year	Location	Improvement
1999	72nd Avenue, from 144th Street to 149A Street	Widen from 2 to 4 lanes with median
	72nd Avenue and 148th Street Intersection	Traffic Control signals, with EB and WB left turn lanes
2004	144th Street, from 72nd Avenue to 78A Avenue	Widen from 2 to 4 lanes with median
	76th Avenue and 144th Street Intersection	Traffic control signals, with SB left turn lane

7.1.5 Development Variances

Several variances to the City's Subdivision Bylaw and/or Engineering Design Standards are recommended. If an applicant for development of a portion of the NCP area wishes to proceed with these recommended standards, he may be required to submit a Development Variance Permit (DVP) application. The City of Surrey Council will accept or deny any variance to the City's Subdivision Bylaw.

The recommended variances and our reasons for proposing them are:

1. Small (9.0 m) radii for 90° bends for "Limited" and "Through" local roads rather than the 15.0 m radii required by Surrey for limited local roads or 50.0 m radii required for a 50 km/hr design standard for through local roads. (This will require an exception on the Engineering Services Agreement Drawings).

   Reasons for Variance

   - A precedence has been set for the use of reduced radii at 90 degree corners by the Fleetwood area (K&D Farms near to 156th Street south of 80 Avenue) of Surrey.
   - The use of tighter radii will improve the land use and densities.
   - Tighter radii will slow traffic.

2. A "P" loop road within area 'C' which exceeds the maximum permissible length of 500 m as stated in the Subdivision Bylaw (This will require a Development Variance Permit).

   Reasons for Variance

   - The slight increase in the length of this P-Loop (524 m actual length as apposed to the 500 m stipulated maximum length) will permit the development of an attractive and efficient layout for Area 'C'.

3. A 20.0 m right-of-way for "Limited Collector" roads rather than the 22.0 m right-of-way required by the City's Standard Construction Documents. (The Subdivision Bylaw states a requirement of 20 m therefore no DVP is required but the exception must be approved by the General Manager-Engineering.)

   Reasons for Variance

   - The proposed R.O.W. is a variation from the design standards but it complies with the Bylaw.
   - A 20.0 m R.O.W. will accommodate all servicing.
   - A narrower R.O.W. will optimize the land use and density.
   - A narrower R.O.W. reduces the land dedication from the school/park site.

Approval for this right-of-way will be required from the BC Hydro, BC Gas, BC Tel utility companies and the City of Surrey servicing departments.

7.2 Sanitary Sewer

The NCP area is located within the Bear Creek Sanitary Trunk Sewer catchment area. The Bear Creek Trunk Sewer is located generally along the northerly boundary of the proposed development within the NCP area. The northeasterly sloping topography allows for the complete NCP area to be serviced by gravity sewers which connect to the Trunk Sewer at various locations. Another trunk sewer will be constructed in the future parallel to and on the south side of the existing trunk sewer. This new sewer will require a 5.0 m right-of-way. This R.O.W. is noted in Figure 5.1.1 and will

be obtained during the subdivision process. The R.O.W. must be located outside of private property.

There are existing sewers on 144th Street between 75th Avenue and the Bear Creek Trunk Sewer, and on 148th Street between 76th Avenue and the Bear Creek Trunk Sewer. These sewers service a limited number of properties. The majority of the properties within the NCP area are being serviced by septic tanks.

The proposed sewer collection system is shown on Figure 7.2.1. The proposal includes extending the existing sewer on 144th Street to 72nd Avenue. A sewer is proposed for 76th Avenue which would service the lands to the south. Lateral sewers which would discharge to the 76th Avenue sewer are proposed for Wiltshire Drive, 148th Street, the proposed 146th Street located east of Wiltshire Drive, the proposed 147A Street south of 74 Avenue, and the proposed 149th Street east of 148th Street.

A sewer on 72nd is not needed for this NCP as 72nd Avenue forms the sewer catchment area boundary. The development fronting 72nd Avenue will be serviced by sanitary sewers located within the rear lanes.

The developments north of 76th Avenue will be serviced by a series of sewers located under the proposed roads. The sewers will connect to the Bear Creek Trunk Sewer at three locations. Walkways of 4.0 m width within 5.0 m rights-of-way will be required wherever sewers traverse lot side yards. These locations are shown on Figure 7.2.1. As the Trunk Sewer was constructed without conventional manholes in some areas, it may be necessary to construct manholes at the proposed connection points.

Where sanitary sewer service is to be provided by gravity sewer connections to the Bear Creek Trunk Sewer, the minimum building floor elevations for all houses must be set a minimum of 1.5 m above the Bear Creek Trunk Sewer crown elevation to prevent building flooding. Each connection will require an odour trap. Topographic constraints may dictate that a limited number of lots may need to install private sewage pumps to lift sewage to the sewers on the street.

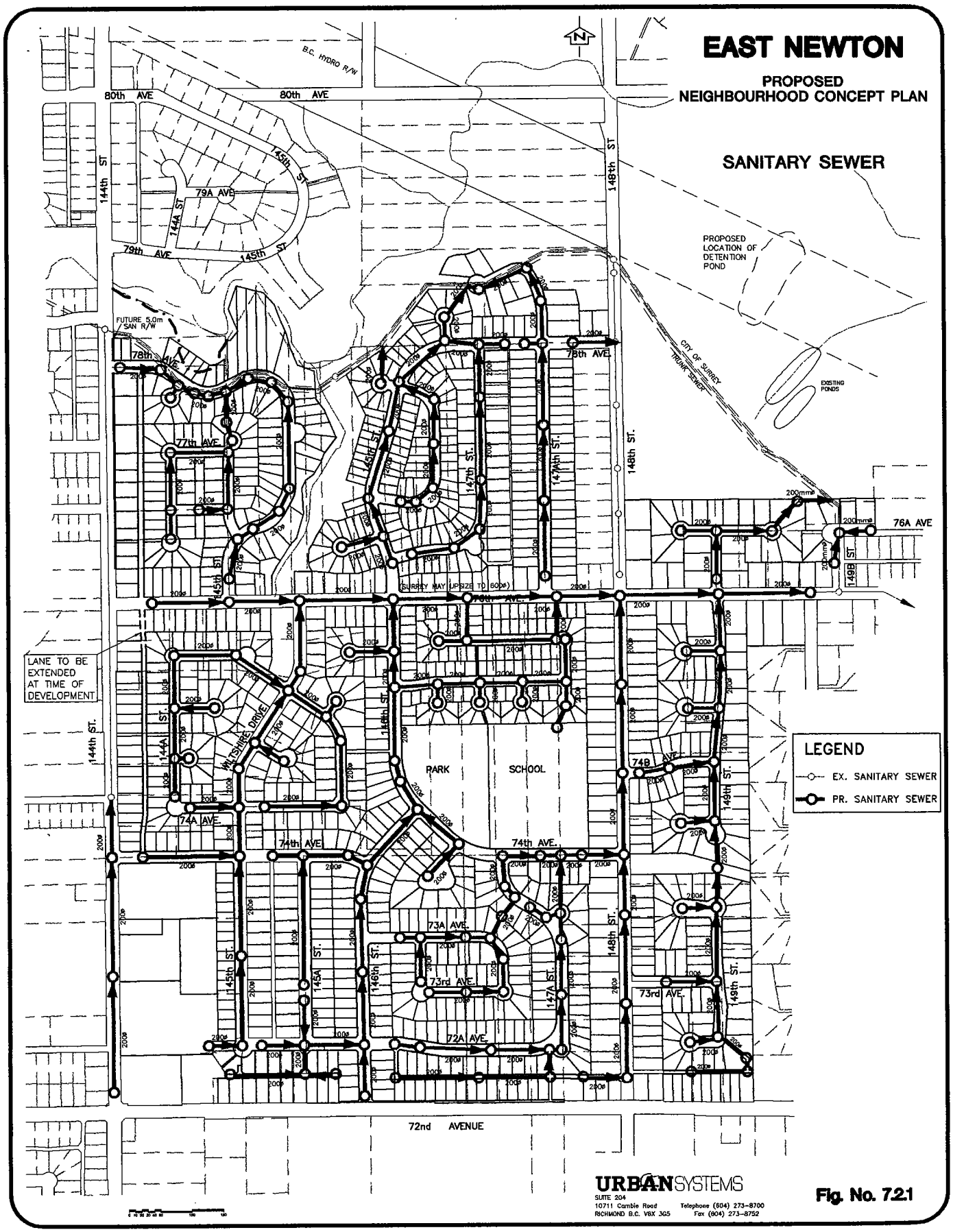

EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
SANITARY SEWER
B.C. HYDRO R/W
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
PROPOSED LOCATION OF DETENTION POND
FUTURE 5.0m SAN R/W
78th AVE
148th ST
CITY OF SURREY TRUNK SEWER
EXISTING PONDS
77th AVE
147th ST.
145th ST.
200mm
76A AVE
149B ST
(SURREY MAY UPSIZE TO 600ø)
76th AVE
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144A ST.
144th ST.
WILTSHIRE DRIVE
146th ST.
PARK
SCHOOL
74B AVE
149th ST.
74A AVE
74th AVE
73A AVE
73rd AVE
145th ST.
145A ST.
147A ST.
72A AVE
72nd AVENUE
LEGEND
EX. SANITARY SEWER
PR. SANITARY SEWER
URBANSYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 7.2.1

The City's 10 Year Servicing Plan includes a provision for the possible upsizing of the sanitary sewer on 76 Avenue between 149B Street and Wiltshire Drive. This upsizing is not necessary for this NCP. If the City does require a sewer which is larger than that required to service the NCP area Surrey will pay for the upsizing.

7.3 Water

Water supply to the NCP area originates at the Newton Pump Station at 128th Street and 62A Avenue. This station pumps water from the Greater Vancouver Water District (GVWD) Newton Reservoir to the 135 metre pressure zone. Water grid mains consisting of parallel 300 mm and 150 mm diameter pipes convey water to the NCP area. A number of pressure reducing stations are required throughout the distribution network. These stations are strategically located in low areas to lower the pressures within these areas to acceptable levels. The existing supply system can provide adequate water to the NCP area. It is important to note that the distribution mains into the NCP area from 72nd Avenue must be connected to both the 300 mm and the 150 mm water mains within this arterial road allowance to ensure an adequate water supply.

The NCP area straddles the 135 metre and 90 metre pressure zone boundary with the 55 metre contour defined as the approximate service area boundary. The NCP area will therefore be serviced from both pressure zones. The area has been divided into two pressure zones using the 55 metre contour as a guide. Figure 7.3.1 identifies the design pressure zone boundary, as well as the existing and proposed water distribution systems.

Pressure reducing stations will be needed on the water mains wherever the mains cross from the upper pressure (135m) zone to the lower (90 m) zone. A new major pressure reducing station will be needed on 72nd Avenue at 148th Street. Three minor pressure reducing stations will be needed within the NCP development.

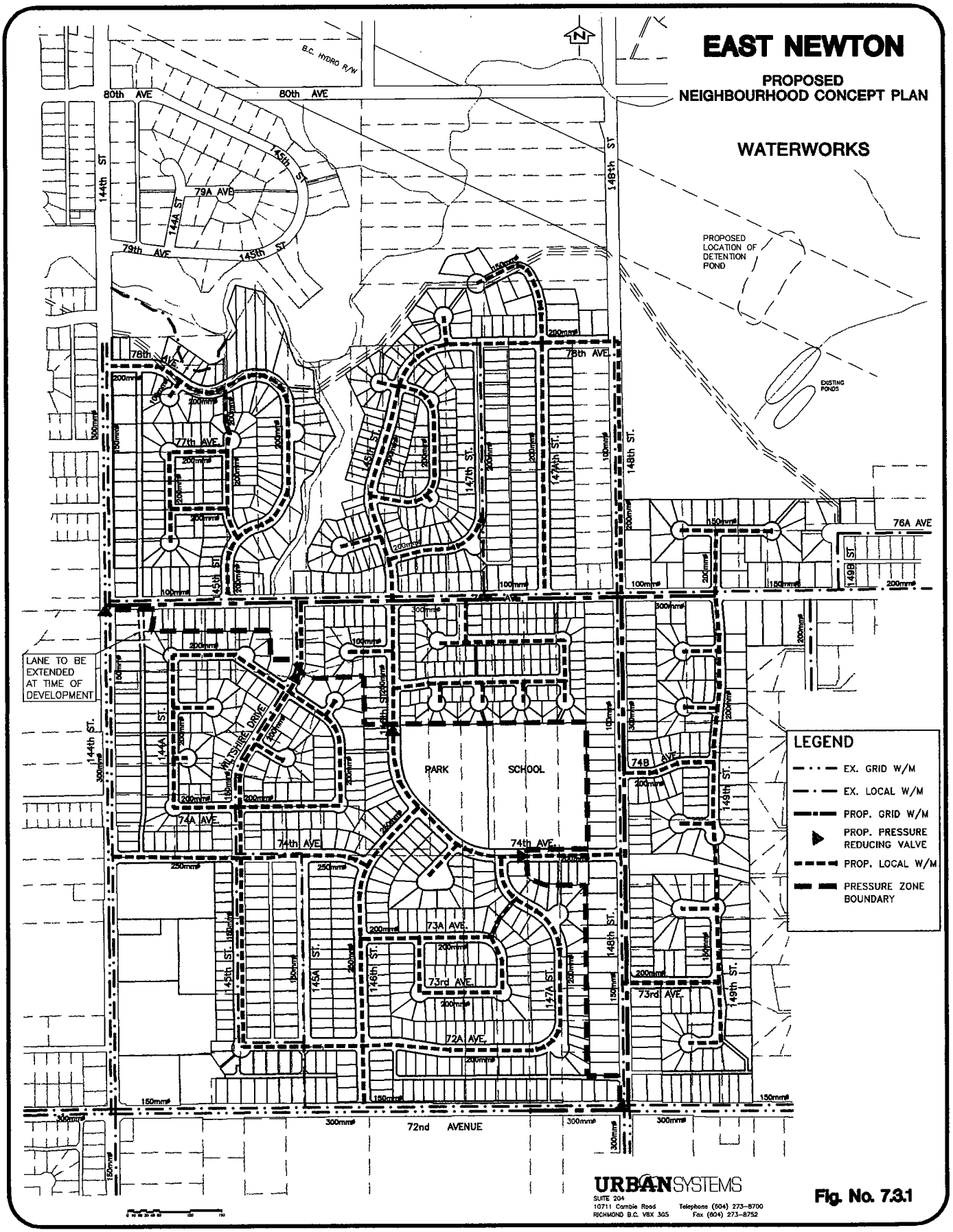

EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
WATERWORKS
B.C. HYDRO R/W
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
148th ST
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
78th AVE
77th AVE
147th ST
76A AVE
149B ST
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144A ST.
WILTSHIRE DRIVE
PARK
SCHOOL
74B AVE
74A AVE
74th AVE
73A AVE
73rd AVE
72A AVE
145A ST.
146th ST.
147A ST.
149th ST.
72nd AVENUE
LEGEND
EX. GRID W/M
EX. LOCAL W/M
PROP. GRID W/M
PROP. PRESSURE REDUCING VALVE
PROP. LOCAL W/M
PRESSURE ZONE BOUNDARY
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 7.3.1

The existing water distribution system includes 300 mm diameter supply mains on 144th Street and on 72nd Avenue, except for a section of 300 mm diameter main between the east property line of the cemetery and 148th Street, and a 150 mm water main on 72nd Avenue. The 144th Street water main provides water into the 135 metre pressure zone south of 76 Avenue and also to the 90 metre zone through a new PRV at 144th Street and 76th Avenue, whereas the 72nd Avenue mains provide water into both pressure zones. 150 mm and 100 mm diameter mains are located on 144th Street, 76th Avenue, 148th Street, 145A Street, 72A Avenue, 145th Street, Wiltshire Drive, 147th Street, 149B Street and 76A Avenue.

The City's 10 Year Servicing Plan includes the installation of a 300 mm main on 76th Avenue between 144th Street and 148th Street and a 350 mm main on and 148th Street between 72nd Avenue and 80th Avenue. A 300 mm water main is required on 148th Street between 72nd Avenue and 76th Avenue to service this NCP area. The 350 mm diameter water main is not required as this size was based upon the assumption that the main would extend to the north to supply areas north of Bear Creek.

The proposed distribution system for the NCP area will consist of 200 mm diameter mains on most streets with the exception that 150 mm mains may be permitted on short cul-de-sacs and 250 mm diameter mains will be located on 74th Avenue and 146th Street. Fire hydrants will not be permitted on lines smaller than 200 mm diameter. These larger mains will provide adequate fire protection at the proposed school. The proposed distribution system will provide sufficient water for peak hour domestic purposes and a maximum day demand domestic flow rate with a fire at any location within the plan area. The proposed system also provides for sufficient looping of mains to improve system efficiency and security.

The proposed water system is anticipated to be sufficient if every element comes into effect at the same time. If only a portion of the total system is constructed by an individual development, the size of the mains which are required may be larger than those indicated in this report. It will be the developer's responsibility to confirm the size requirements to provide adequate water to this development and to pay for any over sizing.

7.4 Storm Drainage

The objective of this storm drainage section is to summarize the effects of the proposed development on existing downstream drainage systems and to present a conceptual design for a drainage and stormwater management infrastructure. The detailed stormwater drainage report is attached as Appendix 4.

The intent of the storm drainage system is to prevent an increase in downstream flows and to reduce the risk of flooding and erosion on downstream lands, as well as address water quality issues. The proposed storm drainage system is shown in Figure 7.4.1.

The overall drainage strategy is to convey the minor (1:5 year) stormwater runoff via storm sewers to a single wet pond detention facility located to the northeast of the study area. The pond will attenuate the post-development peak flows of the 1:2 year storm event to 50% of the post-development 2 year flow and 1:5 year storm event to the 5 year pre-development level while also providing pollutant removal prior to discharge into Bear (Mahood) Creek. Major flows (Greater than 1:5 year) would be conveyed on the ground surface, primarily employing roadways, to direct the runoff to Bear Creek.

The total catchment area of the NCP is approximately 128.1 hectares (ha). The total tributary area to the proposed community pond will be 89.4 ha. Currently the westerly portion of the site with an area of 37.6 ha drains undetained into a tributary of Bear Creek at 76th Avenue and Wiltshire Drive. It is proposed that 20.9 ha of this catchment south of 76th Avenue be diverted to the proposed community pond. The remaining 16.7 ha north of 76th Avenue will continue to drain undetained into Bear Creek. The net effect during the 5 year storm event will be a reduction of flow to the unnamed tributary to Bear Creek and to Bear Creek itself at this western location. It should be noted that a minimum base flow would be diverted into the unnamed tributary in order to maintain a continual low flow to the creek. The detailed design must meet MOELP/DFO requirements.

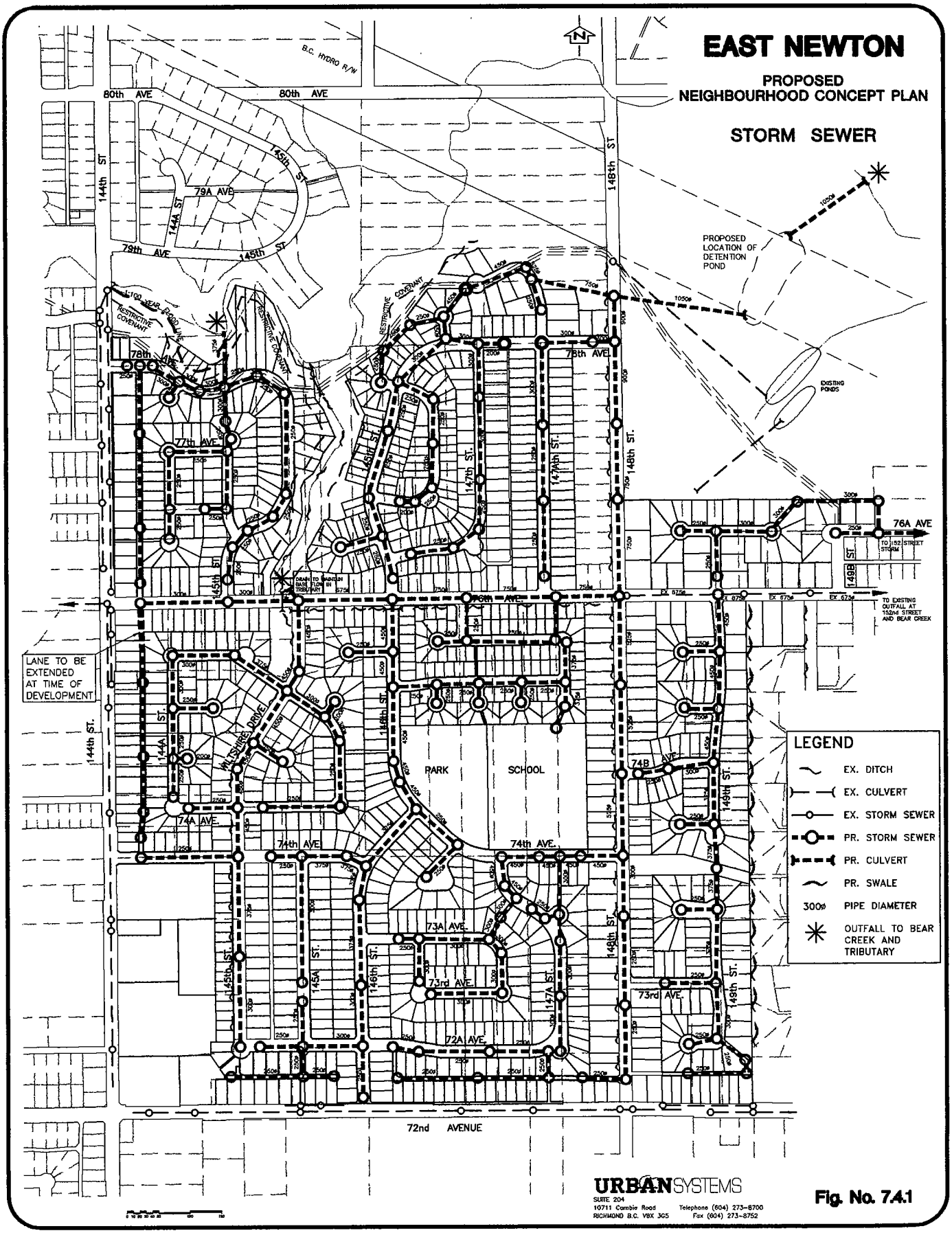

EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
STORM SEWER
B.C. HYDRO R/W
80th AVE
144th ST
145th ST
144A ST
79A AVE
79th AVE
148th ST
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
100 YEAR FLOOD LINE
RESTRICTIVE COVENANT
78th AVE
77th AVE
147th ST.
148th ST.
76A AVE
TO 152 STREET STORM
149B ST
TO EXISTING OUTFALL AT 152nd STREET AND BEAR CREEK
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144A ST.
WILTSHIRE DRIVE
PARK
SCHOOL
74B AVE
74A AVE
74th AVE
73A AVE.
73rd AVE.
72A AVE.
145A ST.
146th ST.
147A ST.
149th ST.
72nd AVENUE
LEGEND
EX. DITCH
EX. CULVERT
EX. STORM SEWER
PR. STORM SEWER
PR. CULVERT
PR. SWALE
300ø PIPE DIAMETER
OUTFALL TO BEAR CREEK AND TRIBUTARY
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 7.4.1

An eastern portion of the site with an area of 107 ha is also currently draining undetained to Bear Creek through a series of storm sewers on 76th Avenue and 152nd Street which discharge into the lower section of the creek. Again, by diverting some of the catchment to the proposed community pond, the undetained area will be reduced to 59.8 ha. The net effect on Bear Creek through the use of the community pond will be attenuation of the post-development peak flows of the 1:2 and 1:5 year storm events for the entire NCP area.

Hydrologic modelling confirms that under ultimate development conditions a single communal detention facility is sufficient to meet the criteria of "no net increase" of stormwater peak flow for minor events (1:5 year and less) for all discharge locations to Bear Creek from the NCP. However, if development of any NCP area were to proceed prior to the construction of the pond and the trunk storm sewer to the pond, interim detention would be required at each development site.

Preliminary discussions have taken place between the NCP Steering Committee, City of Surrey and the Guildford Golf Course. The location of the proposed pond has been accepted in principle by the Guildford Golf Course owners subject to property negotiations and further discussions regarding use of the pond for irrigation during the summer months. A copy of the principles discussed is attached in Appendix 4. BC Hydro has also accepted the pond in principle in their right-of-way subject to certain conditions. A copy of BC Hydro's letter of acceptance is also included in Appendix 4.

Storm sewers may be required along the sides of lots in some areas where the natural contours of the land will otherwise dictate excessively deep sewers within the road allowances or, as in Area A1, to permit connection to Bear Creek. Whenever this occurs a minimum of a 5.0 m wide dedicated corridor will be required. A 4.0 m wide concrete walkway with chainlink fencing on each side must be constructed over all of these sideyard sewers. The storm sewer at the northern limit of Area D will be constructed within the backs of some lots. In this instance a 5.0 m wide right-of-way will be required over the lots. No walkway or fencing will be required for this right-of-way. Lot connections will not be permitted to sewers at the sides or backs of lots.

The BC Ministry of Environment, Lands and Parks requires restriction of access to the Bear Creek green belt area. To comply with this request, any

walkways over sewers in Areas A1 or A2 shall be closed to the public through the installation of chainlink gates locked by City of Surrey padlocks.

The community pond is necessary at some point during the development of the catchment. Interim detention will be required as development proceeds until the City has collected sufficient DCC revenues and built the community pond. Each interim pond should be designed to satisfy the detention requirement of an area between 3 - 10 ha. The release rates should conform to the ultimate drainage strategy as outlined in Appendix 4 of this report. The release rates from the pond should be monitored by the developer to ensure adequate peak flow attenuation. Once the City has installed the ultimate pond, the interim ponds should be reinstated as developable land. The ownership, operation and maintenance of the interim ponds will be the responsibility of the developer. Conceptual locations of interim ponds are shown in Figure 6 of Appendix 4.

Bear Creek at approximately 152nd Street/76th Avenue is tidally influenced. During significant storm events the water level in Bear Creek at this location is high due to the level of the Serpentine River and the large flow from Bear Creek. Any flooding in the Bear Creek floodplain at 152nd Street is minimally mitigated by detention. The typical detention criteria applied to control flows delays the peak flow but it does not retain the flow for discharge following the storm event. Therefore the impact of detention on the larger flooding issue in the Serpentine River/Bear Creek floodplain is minimal.

The NCP Steering Committee has expressed a desire to be able to construct finished basements. In order to permit finished basements below road level, the 1:100 year Hydraulic Grade Line (HGL) must be lowered below the proposed minimum basement elevations (MBE) in accordance with City standards so that flooding will not occur. Two options exist which would achieve this objective. The first option would be to design the closed sewer infrastructure to convey the 1:100 year runoff rates so that the HGL remains within the pipe. The second option is to construct a Third Pipe System, which would involve a second sewer pipe dedicated solely to foundation drain connections. The primary storm sewer system would remain as a 1:5 year system which would receive surface runoff from the roads and possibly other surface intakes. The Third Pipe network would consist primarily of 150 mm piping. Conceptual cost estimates indicate that the Third Pipe System would cost approximately 5 percent more than sizing the system for the 1:100 year storm.

Although the third pipe system is presented as an option in Surrey's storm system design criteria the City is not in favour of this option. The NCP Steering Committee has directed that all storm sewers within the area are to be designed to receive the major 1:100 year return rainfall rather than the minor 1:5 year rainfalls required by the City's design criteria and that all sewers shall be sufficiently deep to accommodate basement houses.

In addition to constructing storm sewers and detention facilities, a number of off-site mitigative measures and Best Management Practices (BMPs) should be implemented to ensure stormwater quality is maintained at the pre-development level or enhanced prior to discharging stormwater into Bear Creek. Sedimentation ponds, gravel pads, mulches and hydroseeding, perimeter ditching with filter fencing and sediment source control are all examples of BMPs necessary during the construction and house building phases of development.

8. Infrastructure Financing and Funding

The proposed infrastructure financing and funding methods for the East Newton North Neighbourhood Concept Plan follow the principles and policies that exist in Surrey today. In summary, there are four new elements proposed for the revised 10 Year Servicing Plan. In addition one new element is proposed for construction outside the current 10 year period. All other DCC infrastructure noted are existing plan items which have been refined to reflect a more accurate scope and the 1996 cost.

It should be noted that the City of Surrey has taken the following approach to infrastructure funding in the NCP area:

1. The long term DCC revenues and expenditures for major collector road, water, sanitary and drainage works should balance or show a positive cash flow at buildout.

2. The short term annual DCC revenues and expenditures must also balance or the community must address the short term cash flow situation.

3. Council has stated that sequencing of the various NCPs will not be supported at this time.

4. The City will not fund interim works such as interim detention ponds.

5. The community based DCC collection and expenditure program is the basis of all DCC capital works and should revenues become available, Council may choose to advance certain works in time and as budget permits. For example in 3 - 4 years there may be enough Surrey-wide DCC funds available to finance the ultimate detention pond for the East Newton NCP.

The following information and cashflow analyses were based on the current City of Surrey's approach to NCP infrastructure financing.

The following financial information is included in this section:

8.1 DCC Elements - Spreadsheets showing all DCC elements identified in the NCP area, including costs, scope, proposed funding method, and construction timing.

8.2 Sketches Showing Existing DCC Elements - The sketches also include reference numbers in the current 10 year plan and show proposed new works.

8.3 Detailed Description of DCC Element - A description of each current and proposed DCC element, including an explanation of any new costs is described.

8.4 Summary of Cashflow Analysis - A description of the analysis and results of various cashflow models.

8.5 Community Detention Pond - A funding method is described.

8.6 Summary Projected NCP Build-out DCC Revenues and Construction Costs - A table is presented showing the projected revenues and expenditures for each DCC service in the NCP.

8.7 Funding of the NCP Process - A cost sharing model is described to recover the 3rd party expenses of the NCP process.

Appendix 6 defines the current funding options available at the City of Surrey.

8.1 DCC Elements

Tables 8.1a through 8.1d list each eligible DCC item by service. Each item is broken down to show estimated cost, type of proposed funding, suggested method of construction (by Surrey or developers) and the year the work is required.

The tables also note whether the item is an addition to the current 10 Year Servicing Plan or a substitution. Substitution in this document means an item which was shown in the 10 Year Servicing Plan on Road A but through refinement of the NCP servicing plan the item was moved to Road B. The purpose and scope of the work has not changed. Only the alignment or length has been modified. All additional costs are noted.

Definition of the funding methods noted on the Tables appears in Appendix 6.

A description of how each item is proposed to be funded is listed in the tables. The year each item is required is included to clarify when works are necessary, based on the needs of the NCP area development.

(Note that the proposed timing shown is based on projected development needs. The actual timing of construction by Surrey may differ. The NCP proponents recognize that Surrey is currently reviewing its 10 year plan. Following Council acceptance of the plan, specific timing will be provided in the revised plan.)

NCP INFRASTRUCTURE FINANCING AND FUNDING

Table 8.1a
Revised March 11, 1996

WATER

Item (Estimates) (Location) (2)	Type/Size of Works	Current or Addition	ID # Current 10 Year Plan	Amount Current Program (1993 $)	Additions to Program (Current $)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Addition to DCC Program	Type of Funding		Construction by (Surrey/Dev.)	Year Requested
									Existing Method (1)	Proposed Method (1)		
72 Ave: 148 St to 155m west ($65,100)	Watermain 300 dia.	Current	#2,449	$46,500 (prorated from 10 year plan)	$18,600	Y	Y	N	CAP	CAP	Surrey	2001
76 Ave: 144 to 148 St ($336,000)	Watermain 300 dia.	Current	#2,448	$240,000	$96,000	Y	Y	N	CAP	DCCR	Developer	1996
148 St: 72 to 76 Ave ($336,000)	Watermain 300 dia.	Current	#2,453 Error in 10 year	$240,000	$96,000	Y	Y	N		DCCR	Developer	2000
New Item A 72 Ave: @ 148 St ($60,000)	PRV Station	Addition	N/A	N/A	$60,000	Y	N	Y	N/A	CAP	Surrey	2000

NOTE: (1) Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT

(2) Estimates are based on unit costs provided by Surrey (Appendix C). All estimates include a 50% estimating factor as requested by Surrey

(3) Analysis has shown that the proposed PRV at 72 Ave. and 148 St. and the proposed main extension on 72 Ave. are not required by this NCP for adequate servicing. The items are required for the South - East Newton NCP.

NCP INFRASTRUCTURE FINANCING AND FUNDING

Table 8.1b
Revised March 11, 1996

SANITARY

Item (Estimates) (Location) (3)	Type/Size of Works	Current or Addition	ID # Current 10 Year Plan	Amount Current Program (1993 $)	Additions to Program (Current $)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Addition to DCC Program	*Type of Funding* Existing Method (1)	Proposed Method(1)	Construction by (Surrey/Dev.)	Year Requested
(2) 76 Ave: Wiltshire to 149B St ($461,700)	Trunk Sewer 600 dia.	Current	#3,293	$211,700	$250,000	Y	Y	N	UPS	UPS	Developer	1996

NOTE: (1) Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT

(2) The proposed NCP land use requires only a 200 mm diameter sanitary sewer on 76 Avenue. If a larger sewer is required by Surrey, the Developer should be reimbursed for the extra cost.

(3) Estimates are based on unit costs provided by Surrey (Appendix C). All estimates include a 50% estimating factor as requested by Surrey.

NCP INFRASTRUCTURE FINANCING AND FUNDING

Table 8.1c
Revised March 11, 1996

STORMWATER

Item (Estimates) (Location) (2)	Type/Size of Works	Current or Addition	ID # Current 10 Year Plan	Amount Current Program (1993 $)	Additions to Program (Current $)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Addition to DCC Program	*Type of Funding* Existing Method (1)	Proposed Method (1)	Construction by (Surrey/Dev.)	Year Requested
New Item A Guildford Golf Course ($1,470,000)	Detention Pond and Outfall Works	Current	#4,044 and #4,045	$510,000	$960,000	Y	Y	N	CAP	CAP	Surrey	1996/97
New Item B 148 St: 76 Ave to Pond ($587,850) (148 St: 74 - 76 Ave in Plan)	Trunk Sewers 750 & 900 dia.	Refinement (Current)	N/A (#707)	N/A ($200,000)	$387,850	Y	Y	Y	N/A	CAP	Surrey	1996/97
New Item C 76 Ave: Wiltshire to 148 St ($390,150)	Trunk Sewer 750 dia.	Addition	N/A	N/A	$390,150	Y	N	Y	N/A	DCCR	Surrey	1996

NOTE: (1) Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT

(2) Estimates are based on unit costs provided by Surrey (Appendix C). All estimates include a 50%
estimating factor as requested by Surrey.

NCP INFRASTRUCTURE FINANCING AND FUNDING

Table 8.1d
Revised March 11, 1996

ROADS AND TRANSPORTATION

Item (Estimates) (Location) (3)	Type/Size of Works	Current or Addition	ID # Current 10 Year Plan	Amount Current Program (1993 $)	Additions to Program (Current $)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Addition to DCC Program	Type of Funding		Construction by (Surrey/Dev.)	Year Requested
									Existing Method (1)	Proposed Method (2)		
(2) 72 Ave: 144 to 149A St ($1,450,000)	Arterial 4-lane divided	Current	#4,142	$1,620,000	$0	Y	Y	N	CAP	CAP	Surrey	1999
76 Ave: 144 to 149B ($515,380)	Major Collector	Current	#1,540	$490,840	$24,540	Y	Y	N	DCCR	DCCR	Developer	1996
148 St: 72 to 76 Ave ($578,120)	Major Collector	Current	#706	$550,590	$27,530	Y	Y	N	DCCR	DCCR	Developer	1998
New Item A 72 Ave: @ 148 St ($80,000)	Traffic Signal	Addition	N/A	N/A	$85,000	Y	N	Y	N/A	CAP	Surrey	1999
New Item B 144 St: @ 76 Ave ($80,000)	Traffic Signal	Addition	N/A	N/A	$85,000	Y	N	Y	N/A	CAP	Surrey	2004
New Item C (2) 144 St: 72 to 78A Ave ($1,813,000)	Arterial	Addition	N/A	N/A	$1,813,000	Y	N	Y	N/A	CAP	Surrey	2004

NOTE: (1) Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT

(2) If abutting sidewalks are required by Surrey when NCP development proceeds they should be constructed by the Developers with payment through DCWs.

(3) Estimates are based on unit costs provided by Surrey (Appendix C). All estimates include a 50% estimating factor as requested by Surrey.

(4) DCC rebates for major collector roads are to interim standard only unless otherwise noted in the current 10 year Servicing Plan.

8.2 Sketches Showing DCC Elements

Figures 8.2.1 through 8.2.4 show all DCC items in the East Newton NCP area. The figures show both existing and proposed DCC items and include 10 Year Servicing Plan reference numbers.

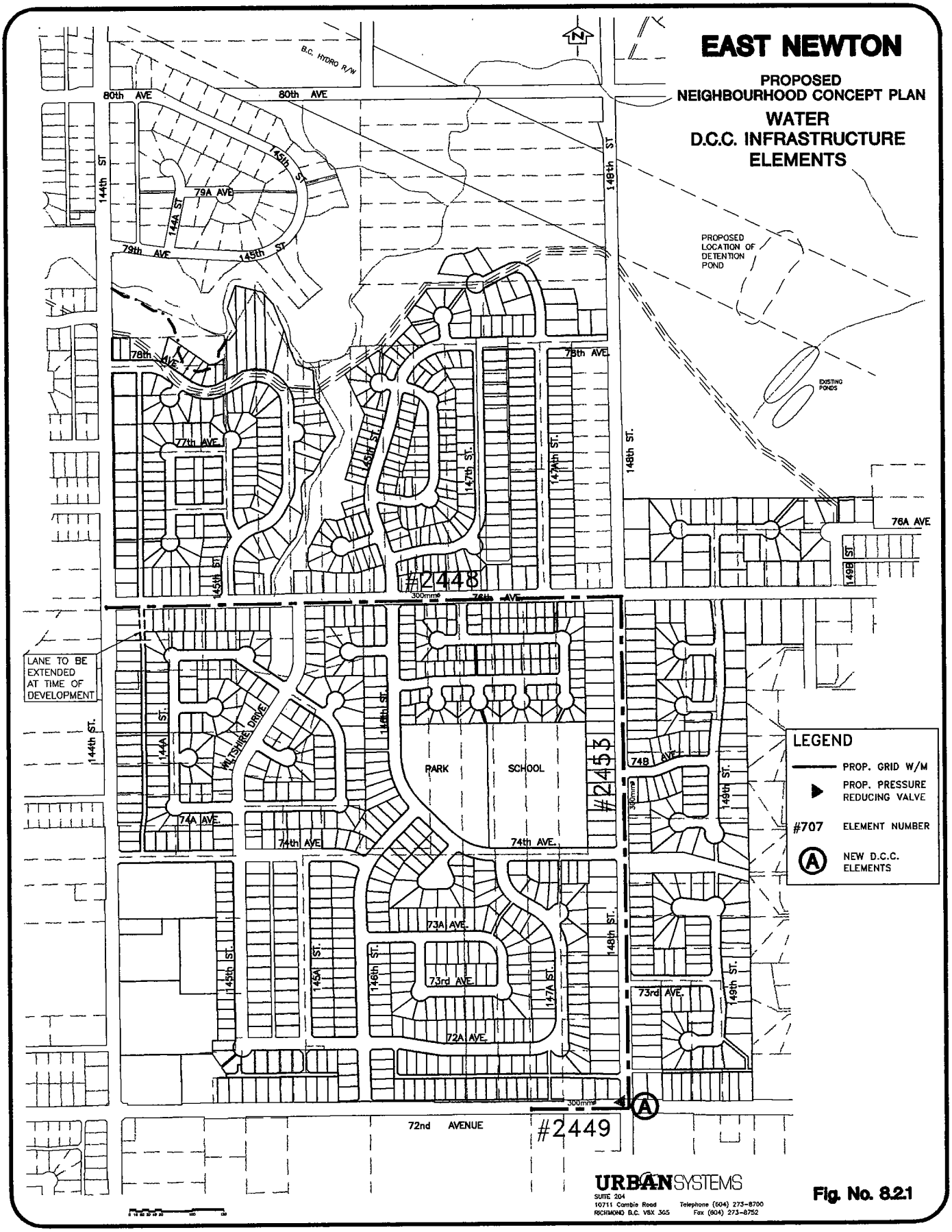

EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
WATER
D.C.C. INFRASTRUCTURE
ELEMENTS
B.C. HYDRO R/W
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
78th AVE
77th AVE
145A ST
147th ST.
147A ST.
148th ST.
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
76A AVE
149B ST
#2448
300mmø
76th AVE.
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144A ST.
WILTSHIRE DRIVE
146th ST.
PARK
SCHOOL
#2453
748 AVE.
149th ST.
74A AVE.
74th AVE
73A AVE.
145th St.
145A ST.
146th ST.
73rd AVE.
147A ST.
72A AVE.
72nd AVENUE
#2449
LEGEND
PROP. GRID W/M
PROP. PRESSURE REDUCING VALVE
#707 ELEMENT NUMBER
A NEW D.C.C. ELEMENTS
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 8.2.1

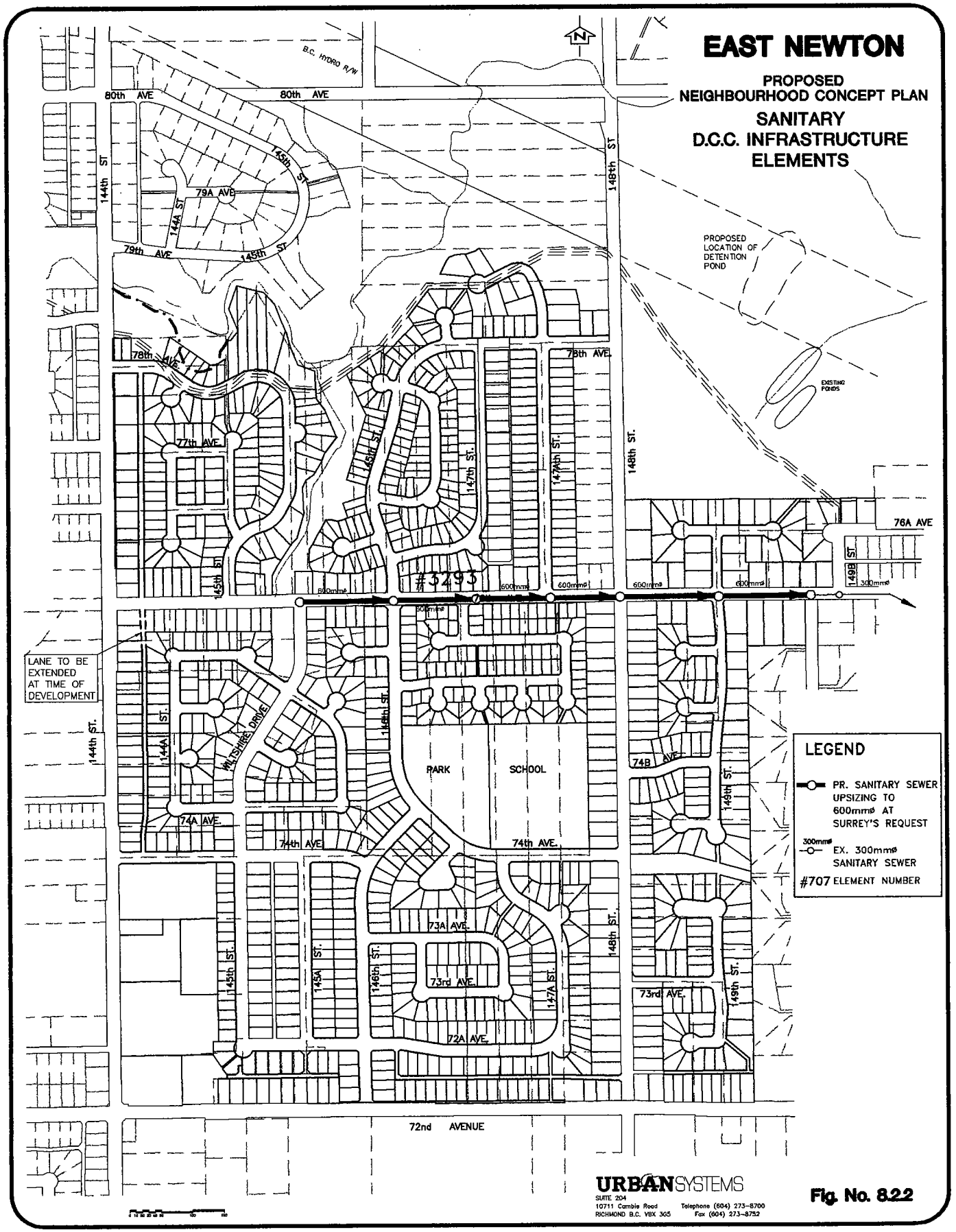
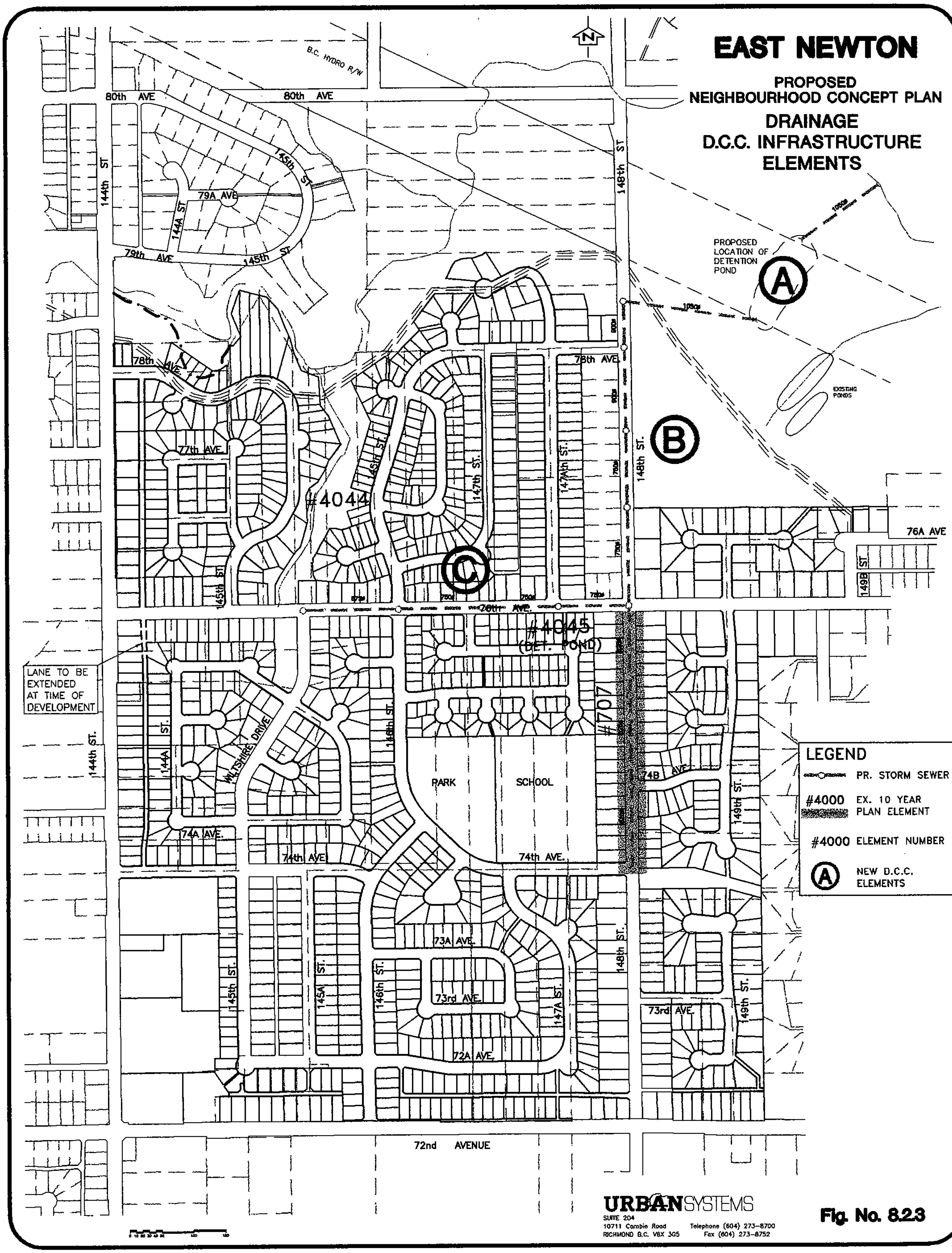

EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
SANITARY
D.C.C. INFRASTRUCTURE
ELEMENTS
B.C. HYDRO R/W
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
78th AVE
77th AVE
145A ST
147th ST.
147A ST.
148th ST.
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
76A AVE
149B ST.
#3293
600mmø
300mmø
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144th ST.
144A ST.
WILTSHIRE DRIVE
145th ST.
146th ST.
PARK
SCHOOL
74B AVE.
74A AVE.
74th AVE.
149th ST.
73A AVE.
73rd AVE.
145A ST.
146th ST.
147A ST.
72A AVE.
72nd AVENUE
LEGEND
PR. SANITARY SEWER UPSIZING TO 600mmø AT SURREY'S REQUEST
300mmø EX. 300mmø SANITARY SEWER
#707 ELEMENT NUMBER
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 8.2.2



EAST NEWTON
PROPOSED NEIGHBOURHOOD CONCEPT PLAN
DRAINAGE
D.C.C. INFRASTRUCTURE ELEMENTS
PROPOSED LOCATION OF DETENTION POND
A
B
C
EXISTING PONDS
#4044
#4045 (DET. POND)
#707
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
PARK
SCHOOL
80th AVE
79th AVE
78th AVE
77th AVE
76th AVE
76A AVE
74B AVE
74A AVE
74th AVE
73A AVE
73rd AVE
72A AVE
72nd AVENUE
144th ST
145th ST
147th ST
147A ST
148th ST
149th ST
WILTSHIRE DRIVE
B.C. HYDRO R/W
LEGEND
PR. STORM SEWER
#4000 EX. 10 YEAR PLAN ELEMENT
#4000 ELEMENT NUMBER
NEW D.C.C. ELEMENTS
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
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Fig. No. 8.2.3

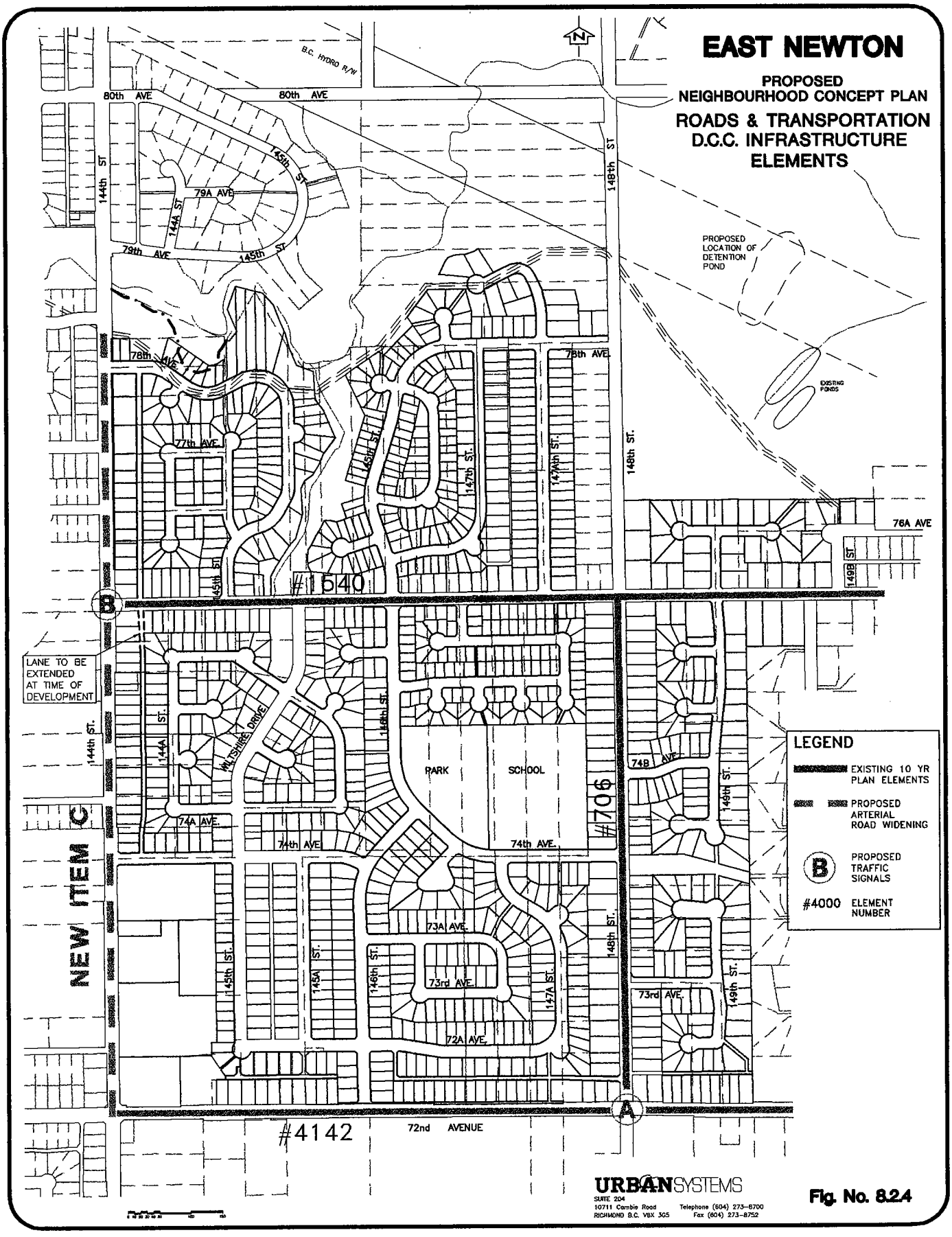
EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
ROADS & TRANSPORTATION
D.C.C. INFRASTRUCTURE
ELEMENTS
B.C. HYDRO R/W
80th AVE
144th ST
145th ST
79A AVE
144A ST
79th AVE
148th ST
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
78th AVE
77th AVE
147th ST
147A ST
76A AVE
149B ST
#1540
145A ST
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
144A ST
WILTSHIRE DRIVE
146th ST
PARK
SCHOOL
74B AVE
74A AVE
74th AVE
#706
149th ST
NEW ITEM C
145th ST
145A ST
146th ST
73A AVE
73rd AVE
147A ST
72A AVE
149A ST
#4142
72nd AVENUE
A
B
C
LEGEND
EXISTING 10 YR PLAN ELEMENTS
PROPOSED ARTERIAL ROAD WIDENING
PROPOSED TRAFFIC SIGNALS
#4000 ELEMENT NUMBER
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 8.24

8.3 Detailed Description of DCC Elements

General Comments

- All estimates in the Tables are in 1996 dollars.
- **All estimates are based on unit costs provided by the City of Surrey**. Details are provided in Appendix C.
- Land costs have been included for the detention pond.
- Land costs are not included for arterial and collector road widenings. Land dedications will typically be provided through future subdivision as development occurs.

8.3.1 Water

(see Figure 8.2.1)

10 Year Servicing Plan Items

#2449-72nd Avenue-300 dia Water Main

- This water main is currently in the 10 Year Servicing Plan.
- The cost estimate has been revised to reflect current costs.
- This item completes a Surrey grid main system which is not necessary to service the NCP area. The timing of the element and construction is projected for the year 2000.
- As development occurs on the south side of 72nd Avenue, this main will likely be completed by development in the south East Newton NCP area, at Surrey's request. The main is not required for this NCP.

#2448-76th Avenue-300 dia Water Main

- This water main is currently in the 10 Year Servicing Plan.
- The cost estimate has been revised to reflect current costs.
- This main is anticipated to be built by Developers fronting 76th Avenue, as required.
- This item is eligible for a DCC rebate to the Developer who builds the water main at time of servicing up to the value of the payable water DCC.
- This main will likely be built starting at 76th Avenue/148th Street and radiate west towards 144th Street as development occurs. To do this a 250 ⌀ main is required to be built from 72nd Avenue along 146th Street to 76th Avenue. This is anticipated to be built by Genstar in the first

and second years of development. Without the 250⌀ main the water extension will have to come from 72nd Avenue and 144th Street.

#2453-148th Street-300 dia Water Main

- This water main is currently in the 10 Year Servicing Plan.
- The cost estimate has been revised to reflect current costs.
- This main is anticipated to be built by Developers fronting the east side of 148th Street, as required.
- This item is eligible for a DCC rebate to the Developer who builds the main at time of servicing up to the value of the payable water DCC.
- This main will likely be built starting at 76th Avenue and 148th Street and radiate south towards 72nd Avenue as development occurs. To do this a 250⌀ main is required to be built from 72nd Avenue along 146th Street to 76th Avenue. This is anticipated to be built by Genstar in the first and second years of development in the area. Without the 250⌀ main the water extension will have to come from the existing service on 72nd Avenue.

New Item A-72nd Avenue @ 148th Street-PRV Station

- This is an addition to the 10 Year Servicing Plan of $60,000 for the PRV station.
- It is proposed that this item be added to the 10 Year Servicing Plan.
- This PRV station is not necessary for the NCP. Timing and construction of the PRV are driven by development outside the NCP. It is likely the PRV would be built by Surrey when they complete water main #2449.

Note: DCC rebates are suggested rather than upsizing as the water main items are in the 10 Year Servicing Plan. The DCC rebate cannot exceed the value of the works constructed. The DCC rebate cannot exceed the water DCC paid.

8.3.2 Sanitary

(see Figure 8.2.2)

10 Year Servicing Plan

#3293-76th Avenue-600 dia Sewer

- This sanitary trunk is currently in the 10 Year Servicing Plan.
- The cost estimate has been revised to reflect current costs.

- The 200 mm dia. sanitary sewer required to service the NCP area will be built by Developers requiring the service.
- The upsizing to the 600 mm dia. as requested by Surrey may be funded by Surrey through upsizing funds. Note that the 600 mm dia. size is not required by the NCP area.

8.3.3 Drainage

(see Figure 8.2.3)

10 Year Servicing Plan

#4044 & #4045 - New Item A-Detention Pond

- In the current 10 Year Servicing Plan two items were included to address peak flow discharge and stormwater quality. The items were ravine storage (#4044) and a community pond (#4045). The total estimated cost was $510,000. The proposed timeline was to start construction prior to 1997. These two items have been replaced with Item A, a community pond on the Guildford Golf Course.
- The additional funding required is $960,000. This amount reflects the land cost and refinement to the original construction cost estimate. No land cost was included in the original 10 Year Servicing Plan estimate.
- The proposed funding method for this pond is described in Section 8.4. Interim detention is also discussed in Section 8.4.
- The 148th Street trunk sewer and pond outfall works are required for the functioning of the pond.
- The pond is proposed to be built by Surrey when funding is available. Given a growth rate of 160 - 190 units per year, enough DCCs from the NCP would be available in the sixth year for construction.
- The current 10 Year Plan shows construction of the East Newton pond in year 1996 but Surrey has stated funds are not available at this time.
- The 10 Year Servicing Plan will have to be revised to reflect the new scope and cost of this trunk.

#707 - New Item B-148th Street to Pond - 750 dia., 900 dia. and 1050 dia. Trunk Sewers

- Item #707, currently in the 10 Year Servicing Plan, is not required. It is proposed to substitute a trunk on 148th Street from 76 Avenue to the pond for Item #707.
- An additional $387,850 will be required to fund this new trunk.
- The 10 Year Servicing Plan will have to be revised to reflect the new scope and cost of this trunk.

- This trunk is proposed to be built by Surrey to coincide with the construction of the community pond. Until the pond is built, interim detained flows in the 76th Avenue system should bypass 148th Street and make use of the 76th Avenue trunk to 156th Street. When the community pond is complete, 76th Avenue flows will be diverted at 148th Street into the 148th Street trunk and community pond.

New Item C - 76th Avenue - 750 dia. Trunk Sewer

- This is a new trunk proposed to direct flows to the proposed trunk sewer on 148th Street (Item B) which will convey flows to the community pond.
- This item should be added to the 10 Year Servicing Plan and is estimated at $390,150.
- It is anticipated that a Developer will construct this trunk as necessary starting in year 1. The construction will likely radiate from 76th Avenue at 148th Street westward as development occurs.
- This item would be eligible for a DCC rebate if added to the DCC program. It is anticipated that the Developer would receive a DCC rebate at the time of servicing. The rebate is up to the lesser of the cost of construction or the value of the payable storm DCC.

8.3.4 Roads and Transportation

(see Figure 8.2.4)

#4142 - 72nd Avenue - Arterial Widening

- This arterial road widening is in the current 10 Year Servicing Plan.
- The widening is not warranted by the anticipated NCP traffic projections.
- Based on the unit costs provided by Surrey, no refinements to costs are required.
- Widening of 72nd Avenue is proposed to be completed by Surrey at its cost prior to 2002.
- Construction of sidewalks and streetlights by Developers on 72nd Avenue may be required by Surrey, at Surrey's cost, as development occurs adjacent to 72nd Avenue.

#1540 - 76th Avenue - Major Collector Widening

- This interim major collector widening is in the current 10 Year Servicing Plan.
- The cost estimate has been revised to reflect current costs.
- The 10 Year Servicing Plan should be adjusted accordingly.

- This item is eligible for a DCC rebate to the Developer who completes the interim widening at time of servicing, to the lesser of the cost of construction or the value of the payable major collector DCC.
- The fronting Developer will be responsible for completion of his side of 76th Avenue from interim to ultimate standard.

#706 - 148th Street - Major Collector Widening

- This interim major collector widening is in the current 10 Year Servicing Plan.
- The cost estimate has been revised to reflect current costs.
- The 10 Year Servicing Plan should be adjusted to reflect the updated cost estimates.
- This item is eligible for a DCC rebate to the Developer who completes the interim widening at time of servicing, up to the lesser of the cost of construction or the value of the payable major collector DCC.
- The fronting Developer will be responsible for completion of his side of 148th Street from interim to ultimate standard.

New Item A - 72nd Avenue @ 148th Street - Traffic Signal

- The new traffic signal is proposed to be added to the DCC program. The estimated cost is $85,000.
- It is anticipated that Surrey will install the signal at its cost when traffic volumes warrant the signal.

New Item B - 144th Street @ 76th Avenue - Traffic Signal

- This new traffic signal is proposed to be added to the DCC program. The estimated cost is $85,000.
- It is anticipated that Surrey will install the signal at its cost when traffic volumes on 144th Street warrant the signal.

New Item C - 144th Street - Arterial Widening

- This proposed arterial widening is estimated at $1,813,000. This item is not in the current 10 Year Servicing Program.
- The widening is not warranted by the NCP generated traffic.
- It is proposed that this item be added to the current 10 Year Servicing Plan.
- Construction of the arterial widening is anticipated to be completed by Surrey at its cost as necessary.
- Construction of sidewalks by Developers on 144th Street may be requested by Surrey, at Surrey's cost.

8.4 Summary of Cashflow Analysis

As stated at the beginning of this section, the City of Surrey has taken the position that each NCP must ensure that both the short and long term DCC revenues and expenditures must balance. The implication of this is that should a large expenditure be required, such as a community detention pond, the NCP must have contributed enough DCCs to fund the pond or develop an alternative solution to detention or a new revenue source. It is from this framework that the NCP completed various cashflow models.

Five cash flow models were completed in the review of the DCC revenues and expenditures for this NCP. All model results were presented to the Surrey engineering department for their review and comment. As part of the modelling, various growth scenarios were investigated. The growth projections varied from a very conservative number of units to a very optimistic projection. For the basis of the final model 160 - 190 units per year were used. That implied buildout of the NCP within 7 -8 years. The Steering Committee reviewed the projections and timeframe and agreed with this projected growth.

The capital costs used are those listed in section 8.1 of this report. The principle used was that as development radiates out from 76th Avenue and 148th Street various engineering works will be required. For example in the first year part of the 76th Avenue storm trunk, water main and road widening will be required. This represented an expenditure of approximately $650,000 for works and a DCC revenue of $865,000. The net effect was a positive short term DCC cash flow. The long term cashflow model is presented in section 8.6 of this report.

The year by year analysis was completed to ensure a positive cashflow. The results were as follows:

1) **Water** - the annual cashflow was always positive. The long term cashflow from the DCC revenues and expenditures proposed in the NCP was a surplus of $487,000 DCC revenue from the NCP.

2) **Sanitary** - the annual cashflow was always positive. The long term cashflow from the DCC revenues and expenditures proposed in the NCP was a surplus of $1,116,000.

3) **Major Collector Roads** - the annual cashflow was positive except for a minor negative balance in the first year ($28,000). The long term cashflow from DCC revenues and expenditures proposed in the NCP was a surplus of $541,600.

4) **Drainage** - due to the large capital cost of the community detention pond and 148th Street trunk sewer it was necessary to postpone the proposed construction of the works until year six in the model. By doing this the annual cashflow is always positive. This will require interim detention ponds to be built and operated by developers at their cost until the pond and 148th Street trunk is in operation. The long-term cashflow from DCC revenues and expenditures proposed in the NCP was a surplus of $96,000.

The cumulative long-term DCC surplus from this NCP is estimated at more than $2.2 million.

It should be noted that the cashflow analysis is only a model. Market conditions, densities, capital costs and other variables can adjust both the revenue and expenditure sides of the equation. The NCP has demonstrated that both on an annual and long-term basis the DCC revenues and expenditure are positive for the City.

8.5 Community Detention Pond

The proposed community detention pond is estimated to cost $1.47 million. The trunk sewer on 148th Street and through the golf course is an integral part of the system and required when the pond is operational. The estimated cost of these trunk sewers is $587,850. In order to fund this system it is proposed that the works be included in the revised 10 Year Servicing Plan and the new DCC program.

Revised DCC Program

The following items are proposed to be included in a revised Drainage DCC program:

1. 148th Street trunk storm sewer and inlet works	$587,850
2. Pond construction cost including outlet works	870,000
3. Allowance for ROW and negotiated settlement with Guildford Golf Course and contingency.	600,000
	$2.06 million

Currently $510,000 is estimated for the pond system and $200,000 for the 148th Street trunk in the 10 year plan in year 1997. An additional $1.35 Million will have to be added to the DCC program.

Through discussions with the City of Surrey it would appear that funding for the community pond in 1996/97 is not likely. Surrey has suggested that funding for the pond from the drainage DCC reserves may not be available for a number of years. The NCP has investigated various options such as Specified Area Charges, a developer based area latecomers agreement and other technical options and determined that at this time, multiple interim detention ponds is the preferred solution.

Interim detention ponds will be required until the community detention pond and 148th Street trunk are constructed by Surrey. This concept was used in the cashflow model and determined that by years 5 - 6 sufficient NCP drainage DCCs would be available to fund the works. This implies that as development proceeds interim ponds will be built and operated by developers as required. The drainage section and Appendix 4 elaborate on the concept of interim detention.

Unfortunately the use of interim ponds can be an ineffective use of financial resources. The ponds typically cost between $100,000 - $300,000 for construction and removal/reinstatement, the carrying costs of the land are on-going and the operation and maintenance of multiple ponds is costly. Given the other options available at this time, interim ponds are still the most practical solution to the short term cashflow problem.

8.6 Summary of Projected NCP Buildout DCC Revenues and Construction Costs

The following table summarizes the projected DCC revenues and construction costs for each engineering service. The revenues are based on the current DCC bylaw. Growth projections are based on buildout of a total of 1200 units. Both costs and revenues are in 1996 dollars.

The NCP proponents estimate an annual development rate of 160 - 190 units per year for a 7 - 8 year period.

Table 8.5: Projected DCC Revenues and Expenditures At Buildout (1)

	Projected DCC Revenues	Projected DCC Expenditures	1993 DCC Ten Year Plan Costs
Sanitary Sewer ($930/unit)	$1,116,000	$461,700	$211,700
Storm Sewer ($2120/unit)	$2,544,000	$2,448,000	$710,000
Water ($1070/unit)	$1,284,000	$797,100	$526,500
Major Collector Rd. ($1220/unit)	$1,464,000	$1,093,500	$1,041,430
Total	$6,452,000	$4,530,300	$2,489,630

(1) Note: It is recognized that the City of Surrey collects DCC's on a community basis not on a NCP or area basis. Table 5 is presented only to show the financial impact of the NCP on the current 10 Year Plan. The table also shows the magnitude of additional works or refined construction costs required to service the NCP area as compared to the 1993 10 Year Servicing Plan.

It is assumed that the need for arterial roads is principally driven by the larger community needs and therefore those costs have not been included in Table 8.5. The projected DCC revenue for arterial roads is $5,760,000.

8.7 Funding of the NCP Process

The Steering Committee agreed to a process that involved the naming of Urban Systems and Davidson Yuen Architects to carry out the required studies.

Genstar, one of the owners in the area has agreed to fund the study on a interim basis on the following terms and conditions:

a) 50% of the NCP costs referred to above will be borne by Genstar;
b) the remaining 50% is to be recovered by the City of Surrey, over the 5 year period after the NCP approval date, and rebated to Genstar to help defray costs. The recovery will be made by Surrey at such time as the owners within the plan area submit applications for rezoning or subdivision, whichever occurs first;

c) the formula for individual cost recovery will be:

$$\frac{\text{Incurred third party costs*}}{2} \times \frac{\text{applicant's acreage}}{225**}$$

* Incurred third party costs include:
1) Planning Consultant Fees
2) Engineering Consultant Fees
3) They do not include any of Genstar's costs in administering this process nor any costs of the Steering Committee

** 225 is the number of developable acres in the NCP minus the Genstar acreage.

The incurred third party costs are expected to be approximately $232,000.

CITY OF SURREY UNIT COSTS FOR CONSTRUCTION ESTIMATES IN NCP

Road Works (including Engineering, Administration, GST, etc,. equalling a 50% factor)

Sidewalk	$75/m
Concrete Curbing	$37.5/m
Boulevard Strip	$21/m
Pavement Widening	$45/sq.m.
Streetlights and Conduit	$150/m
Asphalt Overlay	$9/sq.m.

***Sanitary and Storm Works** (including Engineering, Administration, GST, etc., equalling a 50% factor)

Pipe (mm)	Cost
250	$360/m
300	$375/m
375	$435/m
450	$480/m
525	$510/m
600	$570/m
675	$630/m
750	$765/m
900	$930/m
1050	$1080/m
1200	$1260/m
1350	$1455/m
1500	$1665/m

Major Collector Construction Costs

Interim Standard (8.5m)

Including - detail enclosure, gravel swale, streetlights, pavement widening, overlay, sidewalk one side, catch basins at ultimate and 50% factor for engineering, advertisement, GST, etc.

$1,014/m

***Water Works** (including Engineering, Administration, GST, etc., equalling a 50% factor)

Pipe (mm)	Cost
200	$375/m
250	$390/m
300	$420/m
350	$465/m
400	$480/m
450	$525/m

*Unit costs include catch basins, manholes, tees, hydrants, valves, house services, restoration, rehabilitation, etc. Diversion structures and PRVs have been estimated in the specific item costs shown in Tables 8.1a through 8.1d.

APPENDIX 1
Environmental Reports

An Environmental Overview of the NCP

Raptor Survey Results

AN ENVIRONMENTAL OVERVIEW OF THE EAST NEWTON NEIGHBOURHOOD CONCEPT PLAN (NCP 1)

Prepared for:

URBAN SYSTEMS LTD.
104A - 1815 Kirschener Road
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V1Y 4N7

Prepared by:

ECL ENVIROWEST CONSULTANTS LIMITED
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New Westminster, B.C.
V3L 2B8

Revised - June 1995

envirowest

1.0 INTRODUCTION

ECL Envirowest Consultants Limited (Envirowest) was retained in August 1994 to undertake a preliminary environmental assessment of the East Newton Neighbourhood Concept Plan (NCP 1) area. The objective of the study was to identify sensitive and/or significant environmental features and provide recommendations regarding site development constraints and impact mitigation. Envirowest has reviewed the planning document for the area[1] to ensure that the proposed development complies with the objectives of the environmental approving agencies.

2.0 STUDY AREA

The East Newton NCP 1 area is generally bounded by 144th Street to the west, 72nd Avenue to the south, 149th Street to the east, and Bear (Mahood) Creek and the Guildford Golf Course to the north. The area is currently comprised of rural and semi-rural acreages, with some blocks of smaller residential lots.

3.0 STUDY APPROACH

Envirowest conducted an overview of the study area by reviewing aerial photography and topographic/drainage maps. Subsequently, ground level reconnaissance was performed throughout the study area. All streams were walked in their entirety, assessing fish and wildlife habitat values and physical characteristics. Presence of fish was determined from published records, previous Envirowest studies and onsite sampling. Representative vegetative communities were assessed for species composition. Wildlife was assessed through visual observations only; while few species were observed, the actual number of wildlife species utilizing the study area is expected to be extensive. A raptor/heron survey was completed in accordance with the standard methodology approved by B.C. Environment. Conceptual development plans and proposed stormwater detention pond sites were reviewed to assess impacts on environmental features.

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[1] **Davidson Yuen Simpson Architects and Urban Systems Ltd.** 1994. East Newton North (NCP1). Neighbourhood Concept Plan. Phase I Submission. December 1994. 30p. plus appendices.

4.0 RESULTS

4.1 Streams and Aquatic Habitats

Bear Creek is among the most significant streams in Surrey. It supports populations of both anadromous (sea-going) and resident salmonids, as well as a number of non-salmonid species. Streambanks through the study area exhibit undercutting and minor slumping; however, the stream is relatively stable. Predominant substrates range from large gravels to fines. Deposition of fines overtop of larger substrates is common throughout this section of Mahood Creek (fines limit the productivity of the stream by diminishing populations of aquatic invertebrates and decreasing the permeability of streambed gravels).

Only one tributary of significance exists in the study area. This unnamed stream originates south of 76th Avenue, west of Wiltshire Drive. This stream does not support fish populations, due primarily to lack of access and ephemeral flows. However, substrates and relatively high quality water within this stream produce fish food organisms that are of value to the fish populations of Bear Creek. There is evidence of minor erosion throughout this stream's length. Habitats, fish sampling and potential habitat enhancement opportunities are described in a separate bio-inventory report[2] (attached as Appendix 1).

4.2 Riparian Areas

The riparian zone adjacent to Bear Creek is a key component of the aquatic environment, providing food, cover, shade and bank stability. This area is also an important area for wildlife due to its mature vegetation and proximity to water. Footpaths and trails occur along the creek. The riparian zone of the unnamed stream is also ecologically important.

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[2] **ECL Envirowest Consultants Limited.** 1995. Bio-inventory of an unnamed tributary to Bear Creek, within the East Newton NCP area, Surrey, B.C. Prepared for Genstar Development Company. 5p. plus map.

4.3 Wildlife and Vegetation

A general overview of the study area did not reveal any threatened or endangered species. The raptor/heron survey did not locate any nests of these bird species. However, red-tailed hawks were observed perched within the Guildford Golf Course (to the northeast of the NCP area) and soaring overhead. A list of vegetative species observed is provided in Appendix 2.

4.4 Stormwater Management

Two detention ponds have been proposed to control stormwater runoff from the NCP 1 area. One of these ponds is proposed for an area currently cleared and would not pose any special environmental concerns. A second pond is to be located south of Bear Creek and west of the unnamed tributary in an area characterized by immature red alder forest. The outfalls from the two ponds will be routed through setback areas and will impact on aquatic/riparian habitats.

5.0 RECOMMENDATIONS

Recommendation 1: Riparian preservation zones (setbacks) should be established to preserve and protect the values associated with the stream corridors. Setbacks of at least 15 horizontal metres should be provided adjacent to Bear Creek (only single family residential development is proposed adjacent to the stream corridor). Due to variations in site topography and geomorphology, the setback for Bear Creek should be measured from the 100-year water level (approximately 10.0 metres geodetic) in the western section of the NCP area, and from the top-of-escarpment in the middle and eastern sections. The conceptual plans reflect setbacks for Bear Creek that are significantly wider than the minimum recommended width. Minimum building setbacks of 5.0 metres (rear yard) and 3.0 metres (side yard) should also apply.

Recommendation 2: A riparian preservation zone for the unnamed tributary should be established and include all areas within 9 horizontal metres from the top-of-bank (of the ravine), upstream to the head of the ravine near the south side of the second civic lot upstream (south) of 76th Avenue, where a roadway is proposed.

Recommendation 3: All streams and their riparian zones, as defined above, should be permanently protected by way of registration of restrictive covenants in favour of the Ministry of Environment, Lands and Parks or an approved non-government organization. Permanent fencing (to B.C. Environment standards) should be erected along all covenant boundaries. Trails currently exist within the riparian zones of both Bear Creek and its unnamed tributary. It is recommended that the current trail alignments be retained (with appropriate access points) and upgraded as required. Planning and construction should ensure that there are no adverse impacts to the riparian/aquatic habitats.

Recommendation 4: Wildlife and/or vegetative species that are of special value are likely to be identified as development is planned or as it proceeds. Development should proceed in a sensitive manner to ensure that impacts to these species are mitigated. Rare plant species may be relocated or preserved; wildlife habitats could be either preserved or avoided during sensitive seasons (e.g. nesting periods).

Recommendation 5: While there is evidence of both erosion and sedimentation, a stormwater management plan must be designed and implemented to prevent further degradation of stream habitats within Bear Creek. Of equal or greater importance is the need for sediment and erosion control during construction within the study area.

Recommendation 6: The stormwater management plan for the NCP area should ensure that peak flows do not exceed pre-development levels in the unnamed tributary (either by way of upstream detention or diversion/conveyance of peak flows within a storm sewer system to a detention facility further downstream). Base flows should be maintained in this stream to protect existing invertebrate populations.

Recommendation 7: Both proposed detention ponds are currently located a minimum of 30.0 metres from top-of-bank of Bear Creek. However, should a portion of any pond be located within a setback area, displaced habitat values should be compensated for.

Recommendation 8: Detention features should be designed to provide environmental values. In that regard, it is preferable to develop wet ponds rather than dry ponds.

Recommendation 9: The outfalls from the detention ponds should be designed to minimize impacts to existing instream and riparian habitats of Bear Creek. A mitigation plan should be developed for these proposed outfalls and, if necessary, include compensation habitat designs.

6.0 SUMMARY

Based on our preliminary assessment, development of the East Newton NCP 1 area can proceed without significant loss of habitat values, subject to careful planning and implementation of environmental mitigation/compensation strategies.

APPENDIX 1

BIO-INVENTORY REPORT

BIO-INVENTORY OF AN UNNAMED TRIBUTARY TO BEAR CREEK, WITHIN THE EAST NEWTON NCP AREA, SURREY, B.C.

Prepared for:

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May 1995

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1.0 INTRODUCTION

ECL Envirowest Consultants Limited (Envirowest) has completed a bio-inventory of an unnamed tributary to Bear (Mahood) Creek, Surrey, B.C. from its confluence with Bear Creek upstream to its headwaters south of 76th Avenue. The objective of the bio-inventory was to assess fish habitat values of the watercourse and its tributaries to facilitate the evaluation of development proposals and their potential impacts on fish habitat.

2.0 SURVEY METHODOLOGY

The unnamed tributary to Bear Creek was surveyed on April 28th, 1995. The watercourse is approximately 550 metres in length, and flows generally northwards, entering Bear Creek approximately 300 metres east of 144th Street. From its headwaters, the creek flows through residential properties and mature, second growth forest. Features that were assessed and noted included channel form, instream substrates, instream/overstream cover, predominant riparian vegetation and fish passage obstructions were documented. Summer canopy closure estimates throughout the watercourse were based on the composition, density and maturity of the riparian trees. A Coffelt BP-4 variable voltage electroshocker was used to determine fish species presence and distribution within the watercourse.

For the purposes of this report, the creek has been divided into two reaches divided by the roadway and culverts at 76th Avenue. A written description of the findings is presented below. Distances provided in the report correspond to hip-chain recordings measured upstream from the tributaries confluence with Bear Creek. In order to place the results in a geographical context, a mapsheet summarizing the reach descriptions, fish sampling results and habitat enhancement opportunities is enclosed at the back of this report.

3.0 SURVEY RESULTS

3.1 HABITAT DESCRIPTION - REACH 1 (Bear Creek to 76th Avenue)

Reach 1 of the watercourse is generally characterized as a small stream entrenched within a ravine. At its confluence with Bear Creek, the mouth of this unnamed tributary fans out through cobbles and gravels in which patches of reed canary grass (*Phalaris arundinacea*) grew. At the time of the survey all flows were subsurface through these coarse substrates. The lack of a defined channel, and the very shallow (or subsurface) flows, precludes the movement of fish into the tributary during low and average flows. Upstream of the mouth, the creek enters forested land dominated by red alder (*Alnus rubra*) with black cottonwood (*Populus trichocarpa*), western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) interspersed. Salmonberry (*Rubus spectabilis*) and vine maple (*Acer circinatum*) were the predominant riparian shrubs and

youth-on-age (*Tolmiea menzesii*), sword fern (*Polystichum munitum*), lady fern (*Athyrium felix-femina*) and mosses dominating the ground cover vegetation.

Eighteen metres upstream from Bear Creek the channel width was 3.0 metres, the wetted width was 2 metres and the water depth averaged 5 centimetres. The eastern and western banks were 0.4 metres and 2.5 metres, respectively. Instream substrate materials consisted of gravels, cobbles and boulders. At this point, flows dropped 0.75 m over boulders creating a further barrier to the upstream migration of fish. At 23 metres, flows emerge from a 1,100 mm diameter concrete culvert onto boulders. The culvert conveys the creek under a sanitary trunk sewer. The culvert is approximately 24 metres in length. The culvert gradient exceeds 5 percent and is a barrier to the upstream migration of fish.

Upstream of the sewer crossing culvert, the predominant substrate materials were gravels and cobbles. At 56 metres, instream rocks, back-filled with gravel, have created a 0.35 m drop in the channel bed. A path used for pedestrians and bicycles crosses through the streambed at 68 metres. Approximately 80 metres upstream of Bear Creek, the creek enters a ravine approximately 5 metres wide at the bottom with banks between 3 and 4 metres in height. In the ravine, a dense shrub layer of salmonberry, vine maple, Indian plum (*Osmaronia cerasiformis*), stink current (*Ribes bracteosum*) and red osier dogwood (*Cornus stolonifera*) provided good overstream cover. Pacific bleeding heart (*Dicentra formosa*) and American brooklime (*Veronica beccabunga*) were represented within the groundcover vegetation community described above.

By about 100 metres, the channel averaged 1.0 metre in width, with an average 0.4 metre bank height. Substrates for the rest of the reach consisted of gravels and cobbles with occasional instream boulders. From 114 metres to 129 metres the western bank increased to 1.2 metres in height with hardpan clay and gravel bank materials. Red alder continued as the predominant canopy species with western redcedar becoming the secondary canopy species. Canopy closure was estimated to be 80%. At 142 metres the creek channel was located immediately adjacent to the western toe of the ravine; bank height was estimated at 4 metres. By 160 metres the creek had moved back into the middle of the ravine and both banks were 0.4 metres high. The channel width was 1.3 metres with a 0.8 m wetted width and an average 5 centimetre water depth. At 162 metres a sheet of plywood had been dropped across the creek to provide foot access across the creek. Flows dropped 0.4 metres over a tree root growing across the channel at 183 metres. The root had backfilled with gravel and sand and a 25 centimetre deep plunge pool, 1 square metre in area, had formed on the downstream side of the root.

Flows were subsurface for two metres at about 202 metres and the channel rises 0.6 metres in elevation before the creek returns to the surface. Skunk cabbage (*Lysichiton americanum*) was present in the saturated soils immediately adjacent to the subsurface portion of the creek. Access across the creek is provided by a log and plank bridge 233 metres upstream from Bear Creek. From this bridge to 320 metres the channel was a consistent 1.5 m in width with an average wetted width and water depth of 1.4 metres and 4 centimetres, respectively. Canopy closure and

composition was consistent with the lower portions of the reach and the shrub layer maintained its dense growth. Domestic waste (old bedframes, pieces of household appliances and fencing materials) was present instream, trapping small accumulations of fines at 350 metres, 393 metres and 398 metres. This garbage likely originated from the residential properties immediately adjacent to the east and west of the creek through this section of the reach. More garbage (an old sofa, rubber boots, motorcycle helmet) was present in the creek and along the banks immediately downstream of 76th Avenue. Stinging nettle (*Urtica dioica*) was noted in the riparian zone for 50 metres downstream of 76th Avenue. The reach ends at 76th Avenue, 435 metres upstream of Bear Creek, as flows emerge from a 600 mm diameter concrete culvert directing flows under 76th Avenue. Water depth through the culvert was 1 centimetre.

The watercourse is inaccessible to fish, therefore, its habitat value is restricted to food and nutrient input to Bear Creek.

3.2 HABITAT DESCRIPTION - REACH 2 (Upstream of 76th Avenue)

Reach 2 of the watercourse is a small watercourse contained within a forested ravine. The stream originates at a series of small, shallow ornamental ponds at the head of the ravine. At the downstream limit of reach 2, the stream flows through a 600 mm diameter concrete culvert under 76th Avenue. Drainage ditches along 76th Avenue flow into the stream from both the east and west sides. Immediately south of 76th Avenue, the ravine was 3.0 metres wide at the bottom with 3.5 metre high banks. Red alder and vine maple provided an estimated 80% canopy closure. Salmonberry, Indian plum, Red-osier dogwood, lady fern, sword fern, common horsetail (*Equisitum arvense*), skunk cabbage, creeping buttercup (*Ranunculus repens*), youth-on-age and a variety of mosses and grasses were present in the riparian zone. The channel width was an average 1.2 metres with an average wetted width of 0.4 metres and water depth ranging from a less than a centimetre to 5 centimetres. The instream substrate composition was estimated to be 30% cobbles, 30% gravels and 40% fines. Large amounts of organic debris were present in the wetted width as flows were insufficient to wash the debris out.

At 539 metres (80 metres upstream of 76th Avenue), Douglas-fir were noted amongst the canopy species. Flows pass under a collapsed wooden foot bridge at 564 metres. Upstream of the collapsed bridge, domestic vegetation enter the riparian vegetation community. At 596 metres, two 250 mm diameter culverts (one concrete and one steel) placed end-to-end convey the stream under an access road. Flows within the creek originate at the downstream end of two ornamental ponds constructed in series at civic address 7519 Wiltshire Drive. The ponds are shallow and of limited value in terms of food/nutrient contribution to the stream. Upstream of this point there is only a grassy swale that was dry at the time of the survey.

As with Reach 1, this reach has food and nutrient values only. It does not contain any spawning or rearing habitat values.

3.3 FISH SAMPLING RESULTS

Electroshocking was performed through reaches 1 and 2. No fish were captured (see Table 1).

Table 1. Fish Sampling Results for Tributary to Bear Creek

Reach	Location	Method	Catch	Forklength of Salmonids (mm)
1	17 m upstream of Bear Creek	ES	no fish	
1	74 m upstream of Bear Creek	ES	no fish	
1	235 m upstream of Bear Creek	ES	no fish	
1	immediately downstream of 76th Avenue	ES	no fish	
2	20 m upstream of 76th Avenue	ES	no fish	

ES = Electroshocking (spot sampling)

4.0 HABITAT ENHANCEMENT OPPORTUNITIES

While conducting the stream survey potential habitat enhancement opportunities were noted. A prioritized list of these enhancement opportunities, including location and a brief description of works required, is provided in Table 2. No recommendations are made to improve fish access to the creek as there are insufficient flows in the stream to support salmonids.

Table 2. Prioritized Listing of Habitat Enhancement Opportunities

Priority	Reach	Location	Description of Works
1	1	68 m upstream of Bear Creek	construct a foot bridge over the creek to prevent further erosion
2	1	162 m upstream of Bear Creek	construct a foot bridge over the creek to prevent further erosion
3	1	between 350 m upstream of Bear Creek and 76th Avenue	remove urban debris from the creek channel and riparian zone

APPENDIX 2

VEGETATIVE SPECIES LIST

APPENDIX 2
Native Vegetation Species List by Taxonomic Order

Family ACERACEAE

Acer macrophyllum	big-leaf maple
Acer circinatum	vine maple

Family ARACEAE

Lysichitum americanum	skunk cabbage

Family PINACEAE

Psuedotsuga menziesii	Douglas-fir
Tsuga heterophylla	western hemlock
Picea sitchensis	Sitka spruce

Family CUPRESSACEAE

Thuja plicata	western redcedar

Family BETULACEAE

Alnus rubra	red alder
Betula papyrifera commutata	western white birch
Corylus cornuta	beaked hazelnut

Family CAPRIFOLIACEAE

Symphoricarpos albus	snowberry
Sambucus racemosa	red elderberry

APPENDIX 2 (Contd.)
Native Vegetation Species List by Taxonomic Order

Family SALICEAE

Populus trichocarpa	black cottonwood
Salix lasiandra	Pacific willow
Salix scouleriana	Scoulers' willow
Salix sitchensis	Sitka willow

Family ROSACEAE

Physocarpus capitatus	ninebark
Pyrus fusca	Pacific crab-apple
Rosa woodsii	Woods rose
Rubus spectabilis	salmonberry
Rubus parviflorus	thimbleberry
Rubus nivalis	creeping blackberry
Spiraea douglasii	hardhack
Crataegus douglasii	Black hawthorn
Prunus emarginata	bittercherry

Family RHAMNACEAE

Rhamnus purshiana	cascara

Family ONAGRACEAE

Epilobium angustifolium	fireweed

Family CORNACEAE

Cornus stolonifera	red-osier dogwood
Cornus nuttallii	flowering dogwood

APPENDIX 2 (Contd.)
Native Vegetation Species List by Taxonomic Order

Family POLYPODIACEAE

Polystichum munitum	sword fern
Blechnum spicant	deer fern
Athyrium filix-femina	lady fern

Family EQUISETACEAE

Equisetum arvense	common horsetail
Equisetum telmateia	giant horsetail

Family SAXIFRAGACEAE

Tolmiea menziesii	youth-on-age
Tiarella trifoliata	foamflower
Tellima grandiflora	fringecup

Raptor Survey Results

Table 5

EAST NEWTON NCP
PROPOSED HYDROLOGIC SOILS CONDITIONS

BASIN	AREA (ha) SOIL C	SOIL C WEIGHTE CN	AREA (ha) SOIL D	SOIL D WEIGHTED CN	OVERALL WEIGHTED CN*	WEIGHTED MANNING n*
420	9.3	94	0.6	95	94	0.17
410	4.3	89	2.5	93	90	0.50
390	10.9	94	-	-	94	0.16
380	13.7	94	-	-	94	0.15
370	7.8	94	-	-	94	0.16
360	5.8	94	-	-	94	0.16
350	17.6	94	-	-	94	0.17
340	14.7	93	-	-	93	0.18
330	9.6	94	-	-	94	0.16
320	8.6	94	0.75	95	94	0.17
310	1.2	88	10.6	92	91	0.54
210	4	91	24.9	93	93	0.42
160	0.2	87	12.6	93	93	0.41
150	3	91	-	-	91	0.40
140	13.9	94	-	-	94	0.17
130	4.7	94	2.9	95	94	0.16
120	-	-	4.3	93	93	0.35
110	17.6	93	13.5	95	94	0.19
010	8.5	93	5.0	95	94	0.18

* - Weighted CN and n values are computed based on the land use allocations shown in Table 4.

Table 6

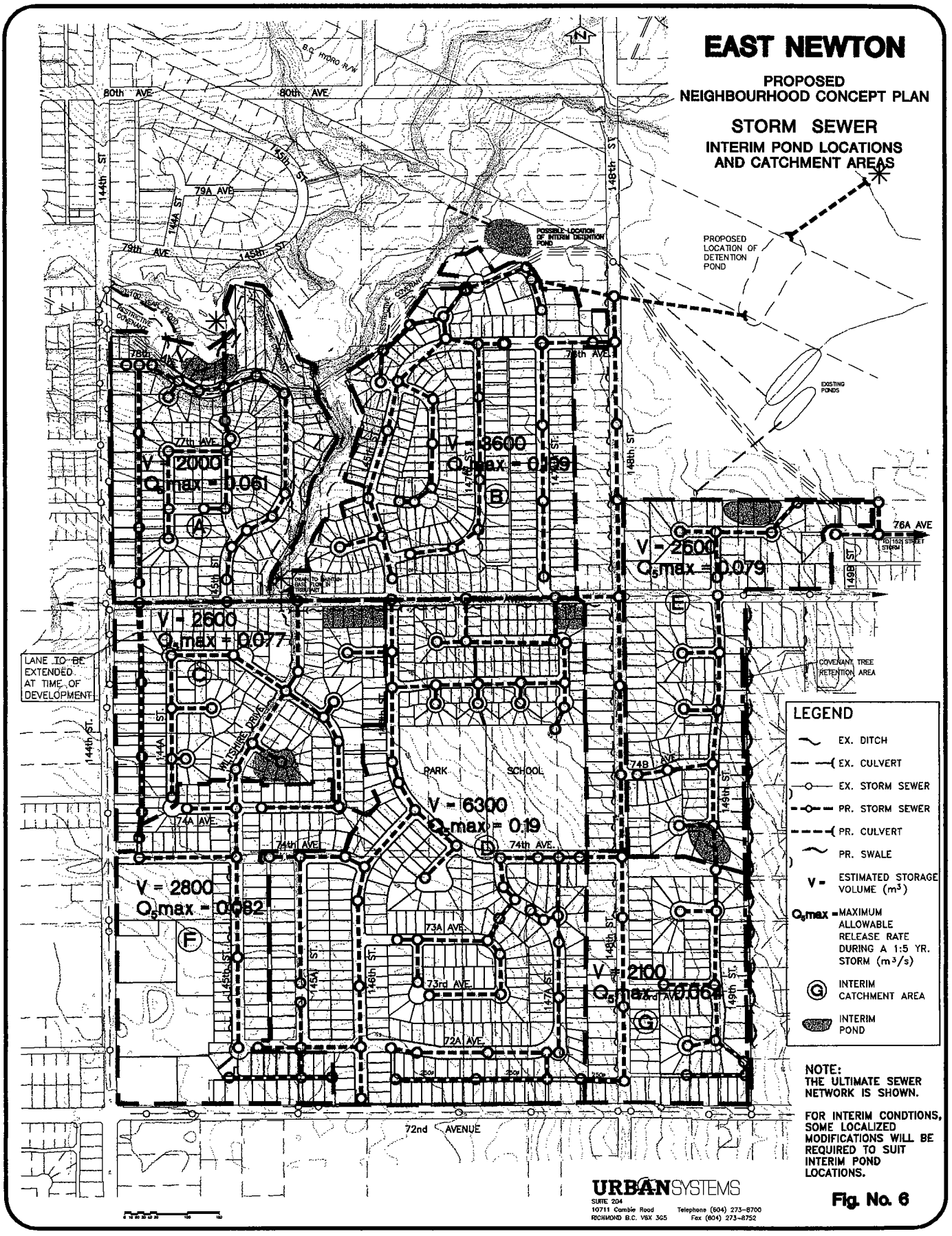
EAST NEWTON NCP

MODELLING PARAMETERS - PROPOSED CONDITIONS

BASIN	AREA (ha)	PERVIOUS LENGTH (m)	GRADE (%)	PERCENT* IMP.	IMPERV. LENGTH (m)	MANNING (n)	CN	IA** (mm)
420	9.9	250	9	19.8	250	0.17	94	3.24
410	6.8	75	7	0.0	75	0.50	90	5.64
390	10.9	180	3	32.7	180	0.16	94	3.30
380	13.7	200	3	19.8	200	0.15	94	3.37
370	7.8	100	2	20.0	100	0.16	94	3.24
360	5.8	100	4	20.0	100	0.16	94	3.24
350	17.6	200	3	19.8	200	0.17	94	3.33
340	14.7	180	5	25.1	180	0.18	93	3.67
330	9.6	170	4	20.0	170	0.16	94	3.24
320	9.3	120	4	19.5	120	0.17	94	3.24
310	11.9	110	1	0.0	110	0.54	91	5.02
210	28.9	350	5	0.0	350	0.42	93	3.82
160	12.8	300	3	0.0	300	0.41	93	3.82
150	3.0	50	2	0.0	50	0.40	91	5.02
140	13.9	130	4	19.9	130	0.17	94	3.30
130	7.5	250	6	19.7	250	0.16	94	3.39
120	4.3	200	3	0.0	200	0.35	93	3.82
110	31.1	200	6	19.0	200	0.19	94	3.24
010	13.5	200	6	19.0	200	0.18	94	3.24

* - Only the directly connected portion of the impervious area is shown.

** - Initial abstraction has been computed based on IA=0.2*S.

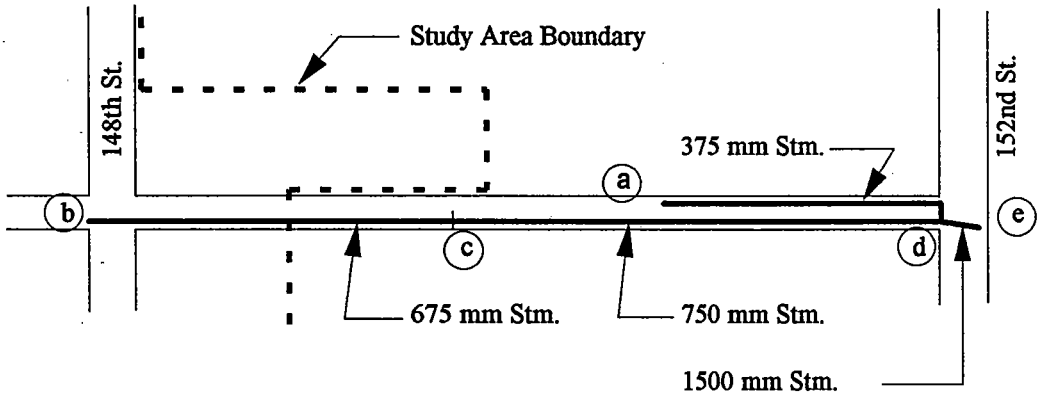

EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
STORM SEWER
INTERIM POND LOCATIONS
AND CATCHMENT AREAS
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
POSSIBLE LOCATION OF INTERIM DETENTION POND
80th AVE
144th ST
145th ST
148th ST
149th ST
79A AVE
79th AVE
78th AVE
77th AVE
76th AVE
76A AVE
74B AVE
74A AVE
74th AVE
73A AVE
73rd AVE
72A AVE
72nd AVENUE
144A ST
145A ST
146th ST
147th ST
148A ST
149B ST
B.C. HYDRO R/W
RESTRICTIVE COVENANT
V = 2000
Q5max = 0.061
V = 3600
Q5max = 0.099
V = 2600
Q5max = 0.079
V = 2600
Q5max = 0.077
V = 6300
Q5max = 0.19
V = 2800
Q5max = 0.082
V = 2100
Q5max = 0.064
A
B
C
D
E
F
G
PARK
SCHOOL
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
COVENANT TREE RETENTION AREA
TO 152d STREET STORM
LEGEND
EX. DITCH
EX. CULVERT
EX. STORM SEWER
PR. STORM SEWER
PR. CULVERT
PR. SWALE
V = ESTIMATED STORAGE VOLUME (m³)
Q5max = MAXIMUM ALLOWABLE RELEASE RATE DURING A 1:5 YR. STORM (m³/s)
INTERIM CATCHMENT AREA
INTERIM POND
NOTE:
THE ULTIMATE SEWER NETWORK IS SHOWN.
FOR INTERIM CONDTIONS, SOME LOCALIZED MODIFICATIONS WILL BE REQUIRED TO SUIT INTERIM POND LOCATIONS.
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752
Fig. No. 6

storage may be an option if the developer finds it cost effective. The catchment areas and control facilities shown have been located in terms of the topography and the proposed sewer network, but do not consider the politics associated with land ownership. The interim ponds will likely take the form of dry detention basins, unless developers wish to construct wet facilities to add aesthetic character to their development.

At this stage it is very difficult to determine a phasing strategy, since many options exist. The development application process is the most significant aspect influencing the phasing strategy. For this reason, not only 30 percent, but the entire study area has been delineated into interim catchment areas. So long as the maximum peak discharge rates and storage volumes, as shown on Figure 6 are adhered to, any amount of development may proceed prior to the construction of the ultimate detention facility. The maximum discharge rates and storage volumes indicated are in accordance with new City policy which allows a maximum discharge of 6 L/s/ha and minimum storage volume of 200 m^3/ha. The volumes indicated will also ensure that the peak 1:5 year runoff does not exceed 6 L/s/ha.

In the interim condition, all development south of 76th Ave and east of 148th Street could discharge to the existing storm sewer running east along 76th Avenue from 148th Street to 152nd Street. A review of the design calculations for this sewer indicates that it has been designed to accommodate a 1:5 year flow rate of 1.2 cms from the NCP area; far greater than the 0.5 cms which would occur under interim conditions. A summary of the flow capacities for this existing sewer is presented in Figure 7.

Figure 7
EXISTING 76th Ave. STORM SEWERS
(148th St. to 152nd St.)



76th Ave.

SEWER CAPACITY SUMMARY

Location	Length (m)	Slope (%)	n	Diam. (mm)	Capacity (cms)
a	45	5.4	0.011	375	0.502
	96	3.0	0.011	375	0.374
	20	0.5	0.011	600	0.535
d	15	1.5	0.011	750	1.178
b	12	3.3	0.011	675	1.787
	193	3.3	0.011	675	1.787
	98	4.9	0.011	675	2.290
	13	3.9	0.011	675	2.044
c	75	6.0	0.011	750	3.356
	37	2.5	0.011	750	2.166
	36	3.0	0.011	750	2.373
	111	3.0	0.011	750	2.373
	18	2.2	0.011	750	2.032
	68	5.1	0.011	750	3.094
	57	1.8	0.011	750	2.804
	94	1.5	0.011	750	1.678
d	27	0.2	0.011	1500	3.900

Note: Design flows for the 1500 mm stm beneath 152nd: Q5= 1.53 cms, Q100=3.36 cms
(Portion of design flow from NCP study area: Q5=1.2 cms, Q100=2.5 cms)

Source: Surrey file 1722-3002, dwg. 81207-24.

6. Hydrologic Modelling

MIDUSS models were created for both the existing and ultimate proposed conditions in order to identify the respective peak flows expected at the five discharge points on Bear Creek.

The first stage of modelling was to identify the critical storm event for each of the five discharge points. A total of five storm durations were modelled which include the 1, 2, and 6 hour Huff storm as well as the 12 and 24 hour SCS storm.

Table 7 presents a summary of modelling results for each of the storm durations at each of the discharge points. The table shows that the Huff 6 hour storm produces the highest peak discharge at all discharge points, while the greatest storage volume required for peak flow attenuation was during the SCS 24 hour storm, due to the greater rainfall volume. Through consultation with the City of Surrey, the Huff 6 hour storm event was chosen as the critical storm since the primary consideration is the peak flow discharge value.

Table 8 presents a summary of peak discharge rates and storage volume requirements, while discharge hydrographs are presented in Appendix A. The table shows that the post-development peak flow is less than or equal to the existing flows at nodes 40, 30, 20, and 10, while exceeding the existing flow by approximately 11 percent at node 0 for the 1:2 storm event.

A Master Drainage Plan prepared by Sigma Resource Consultants Ltd. in August 1977 indicated that the minor and major peak flows in Bear Creek at 152nd Street are 34 m^3/s and 95 m^3/s, respectively. The storm return periods are not known.

Stream flow records for Bear Creek at 144th Street for the years 1989 and 1990 indicate that the maximum instantaneous peak flows were 26.7 m^3/s and 21.8 m^3/s, respectively, with an average of 24.3 m^3/s. The maximum day discharges (highest daily average flow) for the same years were 10.4 m^3/s and 12.3 m^3/s, respectively, with an average of 11.4 m^3/s.

Table 7

EAST NEWTON NCP

MIDUSS MODELLING SUMMARY

DETERMINATION OF CRITICAL STORM EVENT

NO PONDS

STORM	NODE														
	40			30			20			10			0		
	Existing	Proposed	% increase	Existing	Proposed	% increase	Existing	Proposed	% increase	Existing	Proposed	% increase	Existing	Proposed	% increase
HUFF 1 hour	0.2	0.2	0	0.2	2.3	1050	0.3	2.0	567	1.2	2.8	133	1.5	2.9	93
HUFF 2 hour	0.3	0.3	0	0.5	2.3	360	0.7	2.5	257	1.6	3.6	125	2.1	3.9	86
HUFF 6 hour	0.7	0.5	-29	1.1	3.4	209	1.7	3.8	124	2.9	5.6	93	3.0	6.0	100
SCS 12 hour	0.5	0.3	-40	0.7	1.9	171	1.2	2.2	83	2.3	3.2	39	2.4	3.5	46
SCS 24 hour	0.5	0.2	-60	0.7	1.7	143	1.2	1.9	58	2.3	2.9	26	2.4	3.0	25

WITH PONDS

STORM	NODE															STORAGE VOLUME
	40			30			20			10			0			
	Existing	Proposed	% increase	Existing	Proposed	% increase	Existing	Proposed	% increase	Existing	Proposed	% increase	Existing	Proposed	% increase	(m3)
HUFF 1 hour	0.2	0.2	0	0.2	0.4	100	0.3	0.5	67	1.2	1.1	-8	1.5	1.3	-13	4,800
HUFF 2 hour	0.3	0.3	0	0.5	0.9	80	0.7	1.1	57	1.6	1.6	0	2.1	1.9	-10	7,700
HUFF 6 hour	0.7	0.5	-29	1.1	1.2	9	1.7	1.8	6	2.9	2.8	-3	3.0	3.1	3	16,300
SCS 12 hour	0.5	0.3	-40	0.7	0.9	29	1.2	1.3	8	2.3	2.1	-9	2.4	2.2	-8	16,900
SCS 24 hour	0.5	0.2	-60	0.7	0.9	29	1.2	1.2	0	2.3	2.0	-13	2.4	2.2	-8	20,100

* Note: Pond modelling is only approximate. Storage volumes shown are used for evaluation of the critical storm event. Actual storage volumes require detailed modelling which is presented later in this report.

Table 8

MIDUSS MODELLING SUMMARY
EVALUATION OF CRITICAL STORM EVENT (6 HOUR)

ULTIMATE DEVELOPMENT CONDITIONS

	PEAK DISCHARGE (cms)									
NODE	40	40	30	30	20	20	10	10	0	0
RETURN PERIOD	1:2	1:5	1:2	1:5	1:2	1:5	1:2	1:5	1:2	1:5
EXISTING CONDITIONS	0.5	0.7	0.7	1.1	1.1	1.7	1.8	2.9	1.8	3.0
PROPOSED CONDITIONS (uncontrolled)	0.3	0.5	2.3	3.4	2.6	3.8	3.8	5.6	4.1	6.0
PROPOSED CONDITIONS	0.3	0.5	0.7	1.1	1.0	1.6	1.8	2.6	2.0	3.0
DEAD STORAGE VOLUME (m3)	0	0	11,350	11,350	0	0	0	0	0	0
LIVE STORAGE VOLUME (m3)	0	0	13,116	17,480	0	0	0	0	0	0

Table 9

MIDUSS MODELLING SUMMARY

EVALUATION OF 24 HOUR STORM EVENT

ULTIMATE DEVELOPMENT CONDITIONS

	PEAK DISCHARGE (cms)									
NODE	40	40	30	30	20	20	10	10	0	0
RETURN PERIOD	1:2	1:5	1:2	1:5	1:2	1:5	1:2	1:5	1:2	1:5
EXISTING CONDITIONS	0.4	0.5	0.6	0.7	0.9	1.2	1.8	2.3	1.9	2.4
PROPOSED CONDITIONS (uncontrolled)	0.2	0.2	1.4	1.7	1.6	1.9	2.3	2.9	2.5	3.0
PROPOSED CONDITIONS	0.2	0.2	0.6	1.0	0.9	1.2	1.6	1.9	1.7	2.1
DEAD STORAGE VOLUME (m3)	0	0	11,350	11,350	0	0	0	0	0	0
LIVE STORAGE VOLUME (m3)	0	0	18,194	19,752	0	0	0	0	0	0

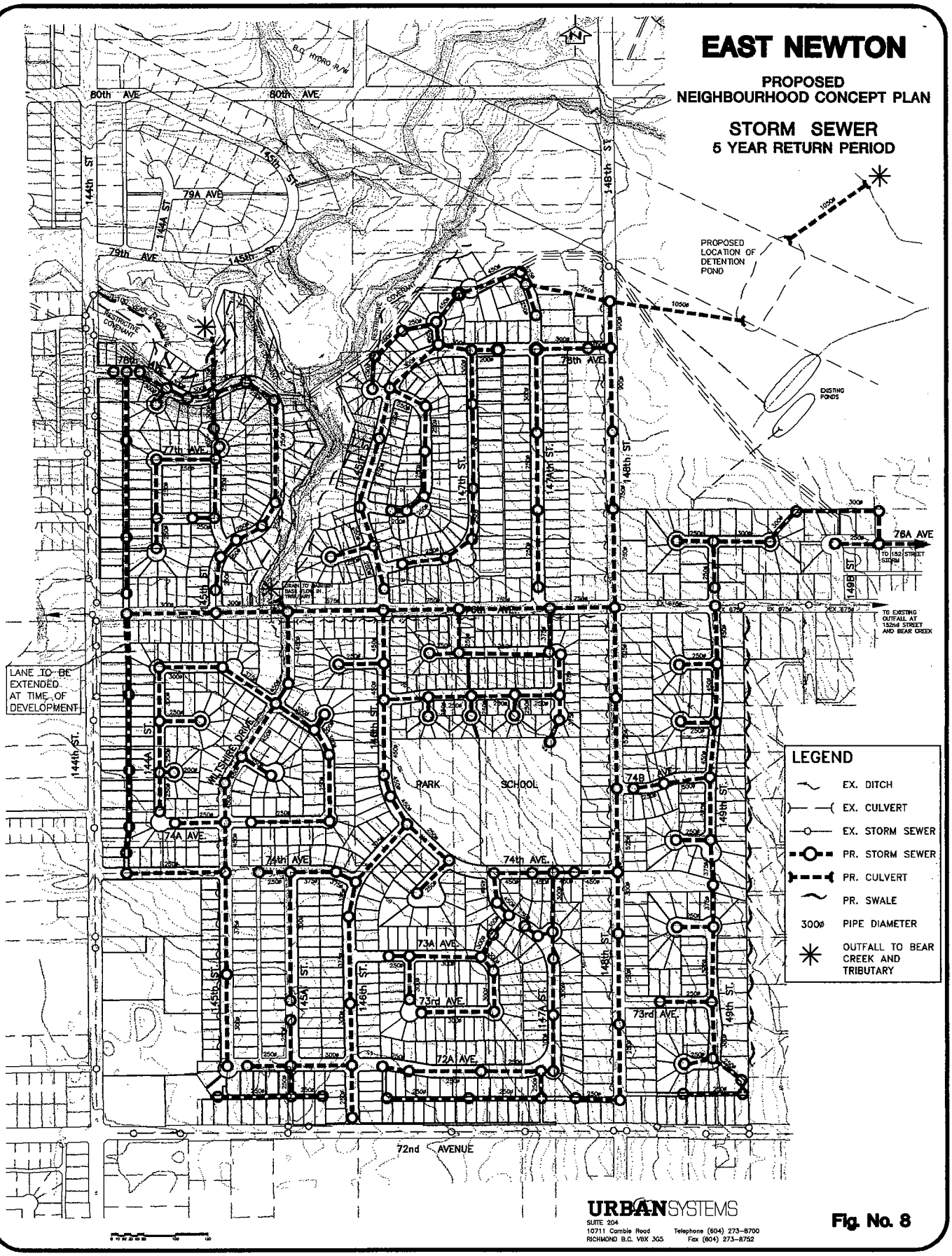
7. Proposed Infrastructure

The overall strategy of the drainage system will be to convey runoff from approximately 75 percent of the developable area to a communal detention facility located to the north east of the study area. The preferred location for the facility is within the Guilford Golf Course. However the Steering Committee has not yet obtained consent from the golf course to place the facility within their property. Until the golf course location is confirmed the detention facility will remain as shown on Figure 4. Regardless of the pond location, the overall strategy and detention facility requirements will remain relatively unchanged.

By diverting much of the drainage north along 148th Street, the drainage area to 152nd Street will be reduced from the current 130 hectares to 86 hectares and the total impervious surface area will remain unchanged from that of existing conditions. The existing storm sewer on 76th Avenue has sufficient capacity to convey the 1:100 year runoff from future developments east of 148th Street. Through approval from the City of Surrey, detention is not being provided to compensate for the Chimney Hill development

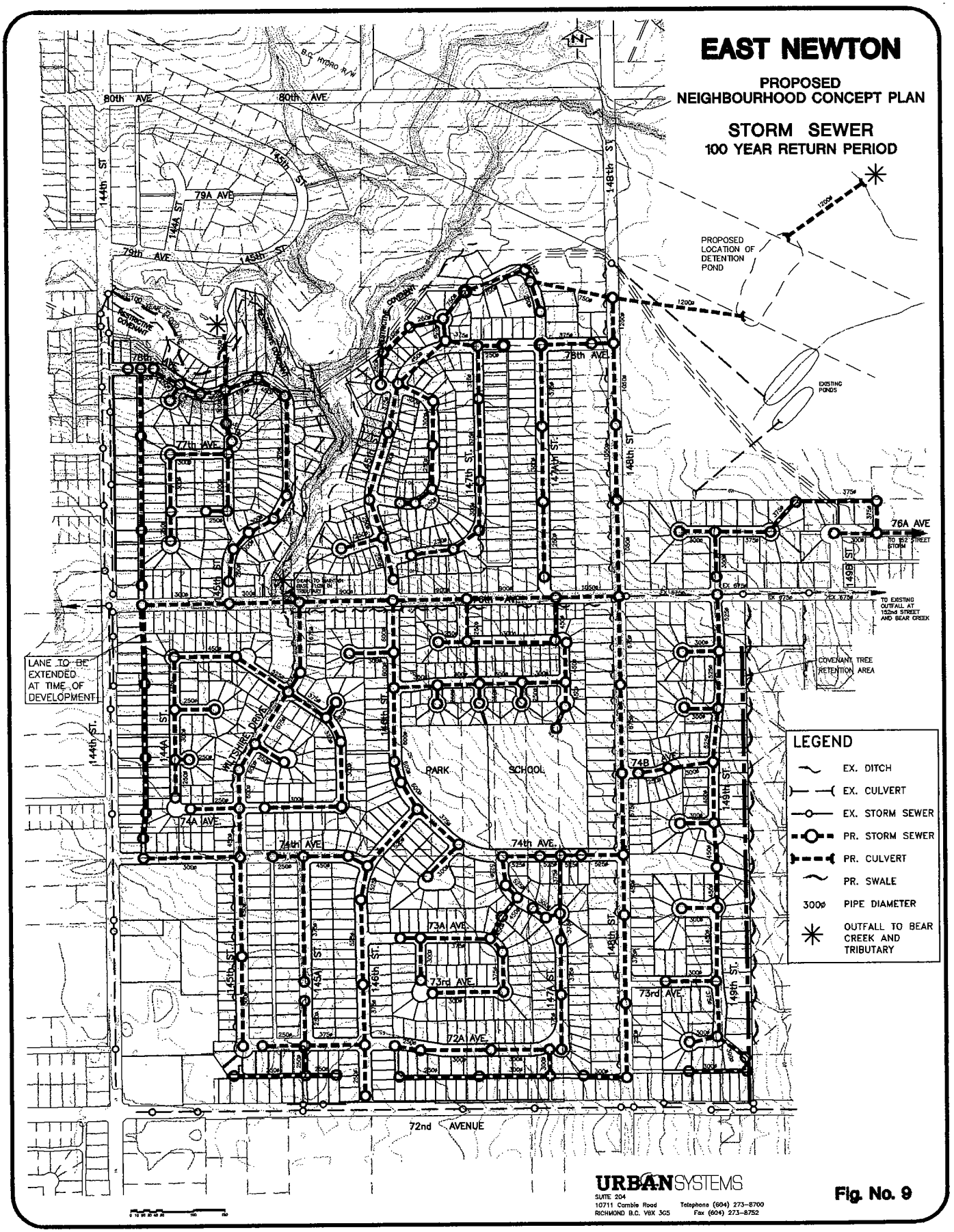
7.1 Storm Sewer Network

Figure 8 presents the proposed storm sewer network for the NCP area and indicates preliminary sizing to convey the 1:5 year runoff, in accordance with currently City standards. However, as indicated earlier, sizing the system for 1:100 year flows is being considered to allow for basement construction. Should this be decided, Figure 9 presents preliminary sizing to convey the 1:100 year flows.



URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752

Fig. No. 8



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Fax (604) 273-8752

Fig. No. 9

If basements are desired, an alternative to designing for the 1:100 year event is to construct a Third Pipe System, which would involve a twin drainage system dedicated solely to the foundation drains. The storm sewer network would be designed to convey the 1:5 year event, while the Third Pipe system would be primarily made up of 150 mm diameter pipes. This alternative does require additional trenching width and may be difficult to accommodate in narrower roadways.

The following table summarizes the conceptual cost estimates for the alternatives.

Summary of Storm Sewer Costs

	Construction Cost	Eng. & Cont. (35%)	Total Cost
1:5 year system	$2,443,000	$855,000	$3,298,000
1:100 year system	$2,949,000	$1,032,000	$3,981,000
Third Pipe system	$3,105,000	$1,087,000	$4,192,000

The above costs are estimates for the entire sewer network as presented on Figures 8 and 9. The average unit total costs equate to $0.70/mm/m of pipe (inclusive of manholes) for the storm sewer network and an additional $0.45/mm/m for the Third Pipe System.

Right-of-way (ROW) are required for Area A (Figure 6) from approximately 78A Avenue and 14450 Block to Bear Creek. This ROW will be a requirement of the development application process. Other land and ROW requirements are noted in the detention facilities section.

7.2 Major Runoff

If the storm sewer infrastructure is designed to convey the 1:5 year discharge, roadways will be utilized for the most part to convey the major runoff through the study area. For developments north of 76th Avenue the major runoff paths will follow that of the minor runoff. However, at the intersection of 76th Avenue and 148th Street major runoff from all development south of 76th Avenue could be diverted east along 76th Avenue and discharge directly to 152nd Street. Hydrologic modelling indicates that approximately 1.3 cms would be diverted as major flow to 152nd Street, which when added to runoff from areas east of 148th Street, will cause surcharging of the existing sewers on 76th Avenue. However, the existing 1500 mm diameter sewer beneath 152nd Street does have sufficient capacity to convey the 1:100 year discharge. To ensure the major flow is able to enter this 1500 mm sewer, high capacity inlets will be required on 76th Avenue immediately west of 152nd Street.

The major runoff depth on 76th Avenue would remain below the top of curb elevation. To ensure the major runoff is directed east from 148th Street, the intersection with 76th Avenue would be super-elevated at 2 percent and still have capacity to convey major runoff without overtopping the boulevard. If superelevation is not provided, major runoff will split at the intersection of 76th Avenue and 148th Street and be conveyed both north and east. The intent of directing major flow eastward is to shorten the flow path to Bear Creek and reduce the risk of erosion on the golf course.

As discussed earlier, routing major flows overland will prevent the construction of basements below the 1:100 year HGL. If the major flow were to be routed below ground from 148th Street to 152nd Street to allow lowering of basement elevations, the existing 675 and 750 mm diameter sewers under 76th Avenue would require upgrading to 750 and 975 mm diameters respectively.

Modelling indicates that the geometry of the existing ditches and channels east of 152nd Street do have capacity to convey the future major flows to Bear Creek, however, consideration should be given to providing some erosion protection on the sides and bottoms of these channels, especially at headwall locations. Based on a site visit it is apparent that erosion of

the native soils is found to be higher than a group D soil, the ponds will require lining either with a clay liner or a geomembrane.

Table 10 summarizes the geometry and operation levels of the facility, which has been sized to meet Department of Fisheries and Oceans standards. Of most interest, the total area requirements for the facility is 20,300 m^2. This area would satisfy the detention and freeboard requirements and allows for a 3 meter wide access road around the facility.

Should earthworks and landscaping be required outside of the pond boundaries, additional area will be required. Rights-of-way (ROW) are required for the trunk storm sewer from 148th Street to the pond, the pond including a maintenance area and for the outlet storm sewer to Bear Creek. The financial implications of these ROW are discussed in the financial section 8.0 of this report.

The facility will require a multi staged outlet structure to provide control for both the 1:2 year and 1:5 year events and an emergency overflow to allow controlled discharge for events exceeding 1:5 years, up to the 1:100 year event. The path for the discharge should minimize the distance between the pond and Bear Creek. The pond will need to be completely drained for maintenance. A combination of base drain and portable pumping would be used to drain the pond. Draining of any of the sediment into Bear Creek must be avoided.

The pond will be designed to remove sediment from the drainage system. A forebay area will be designed to assist in sediment and pollutant removal. An adequate maintenance area will be required next to the forebay area to permit removal of sediments.

Table 10

EAST NEWTON NCP

SUMMARY OF STORAGE POND OPERATION

Dead Storage Depth (m)		0.95
Live Storage Depth (m)	1:2 yr	0.91
	1:5 yr	1.22
Maximum Operating Depth (m)		2.17
Freeboard Depth (m)		0.70
Total Pond Depth (m)		2.87
Emergency 1:100 year ponding depth (m)		2.67
Total Area (Top of Pond)(m2)		18,500
Add 3 m access road all around		1,800
Approximate Total Required Area (m2)		20,300

Note: Ponds have been designed in accordance with Department of Fisheries and Oceans standards. The pond areas have been calculated based on interior side slopes of 4:1 for the dead storage and freeboard portions and 7:1 for the live storage portion.

Note: The cross sections given to BC Hydro were for conceptual discussion only. Side slopes will be 7:1 and 4:1.

This table does not include any areas which may be required for earthworks or landscaping outside of the freeboard limits.

7.4 Best Management Practices (BMP)

The primary BMP is implementation of the wet pond facilities to provide physical pollutant removal. A maintenance program should be established to ensure that the ponds and outlet structures are free from heavy sediment loadings so that they maintain their designed hydraulic capacity and to ensure the outlet structures are not clogged. A sump at the entrance to the pond is required for collection of sediments. Oil-water separators are not proposed for the pond.

Oil-water separators are suitable for removal of contaminants from small areas of concentrated activity such as a gas station or parking facility, but are commonly found to have limited effectiveness when implemented in a large-scale stormwater runoff application. The "Stormceptor" unit, as distributed by LaFarge Construction Materials, appears to provide a quality alternative to conventional oil-water separators. The primary advantage of the Stormceptor is that during high flow conditions the runoff is diverted past the storage chamber, which ensures that collected pollutants are not washed from the chamber. However, like the detention facility, regular monitoring and maintenance programs are required to ensure their effective operation.

Although it may not be cost effective for single family residential development, the Stormceptor may be ideal for commercial and institutional parking facilities within the NCP. A description of the Stormceptor is attached in Appendix B.

Leave strips and vegetative buffers along Bear Creek and its tributaries have been accounted for in the conceptual development plan and are reflected in the NCP Report.

Overland drainage channels and swales must be sufficiently lined with a dense vegetative lining and rip-rap channel protection should be provided at all discharge locations to prevent channel bank erosion, including the existing channels east of 152nd Street. In addition, all major outfalls should include energy dissipators to reduce the discharge velocity to 1 m/s.

EAST NEWTON
NCP STEERING
COMMITTEE

East Newton Neighbourhood Concept Plan

Final Report

APPENDIX A

DISCHARGE HYDROGRAPHS

URBANSYSTEMS

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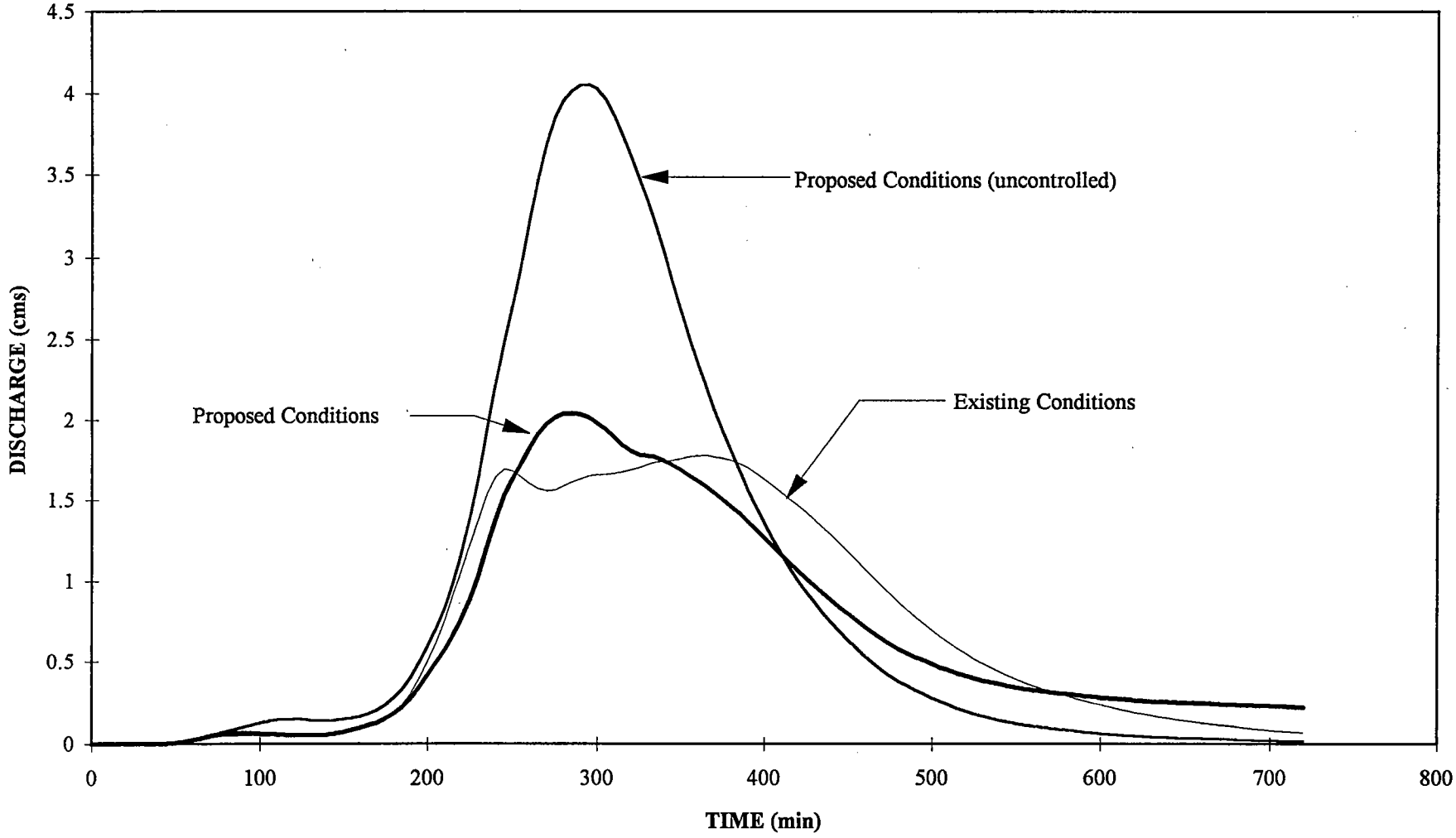
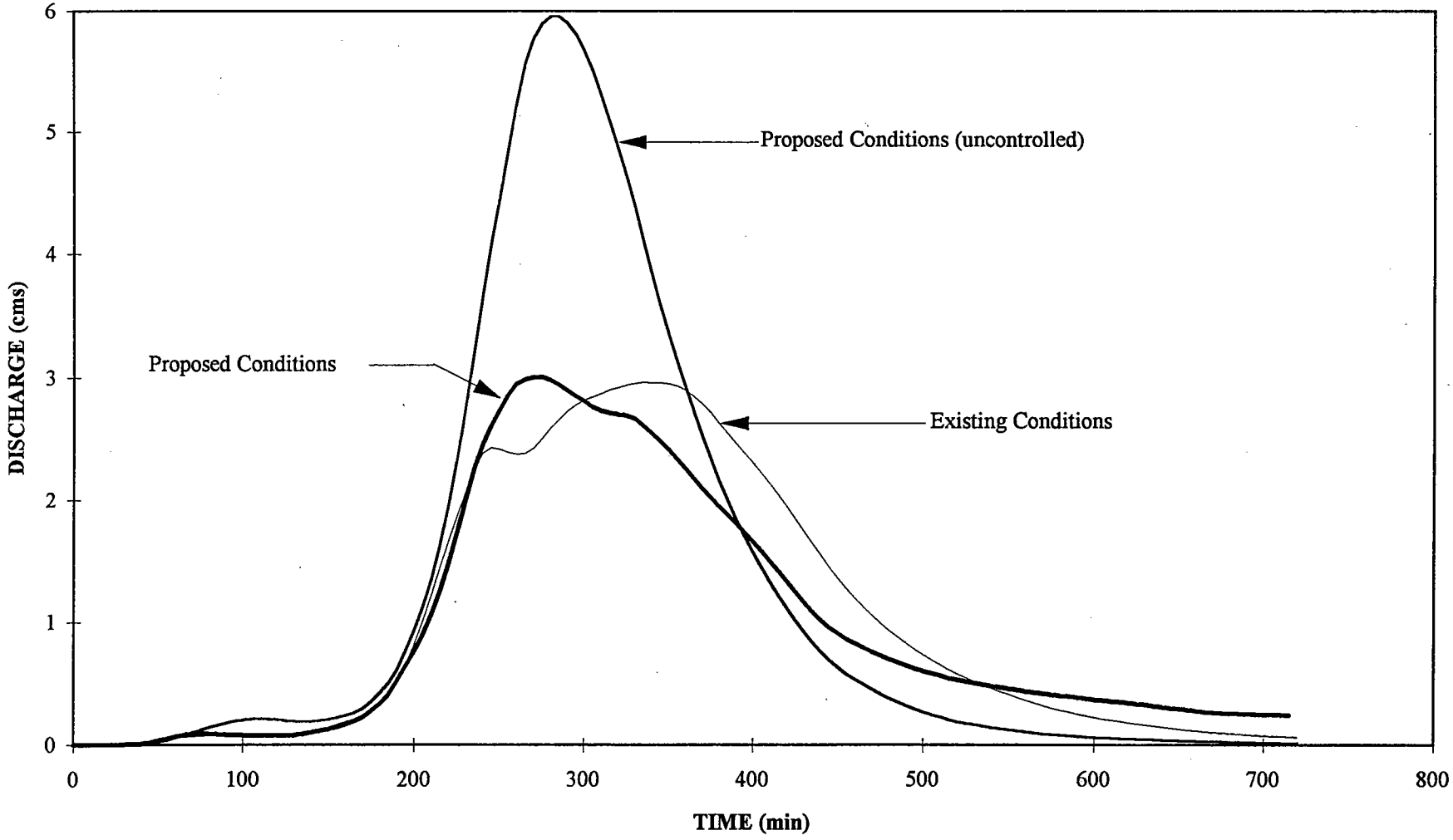
June 1996

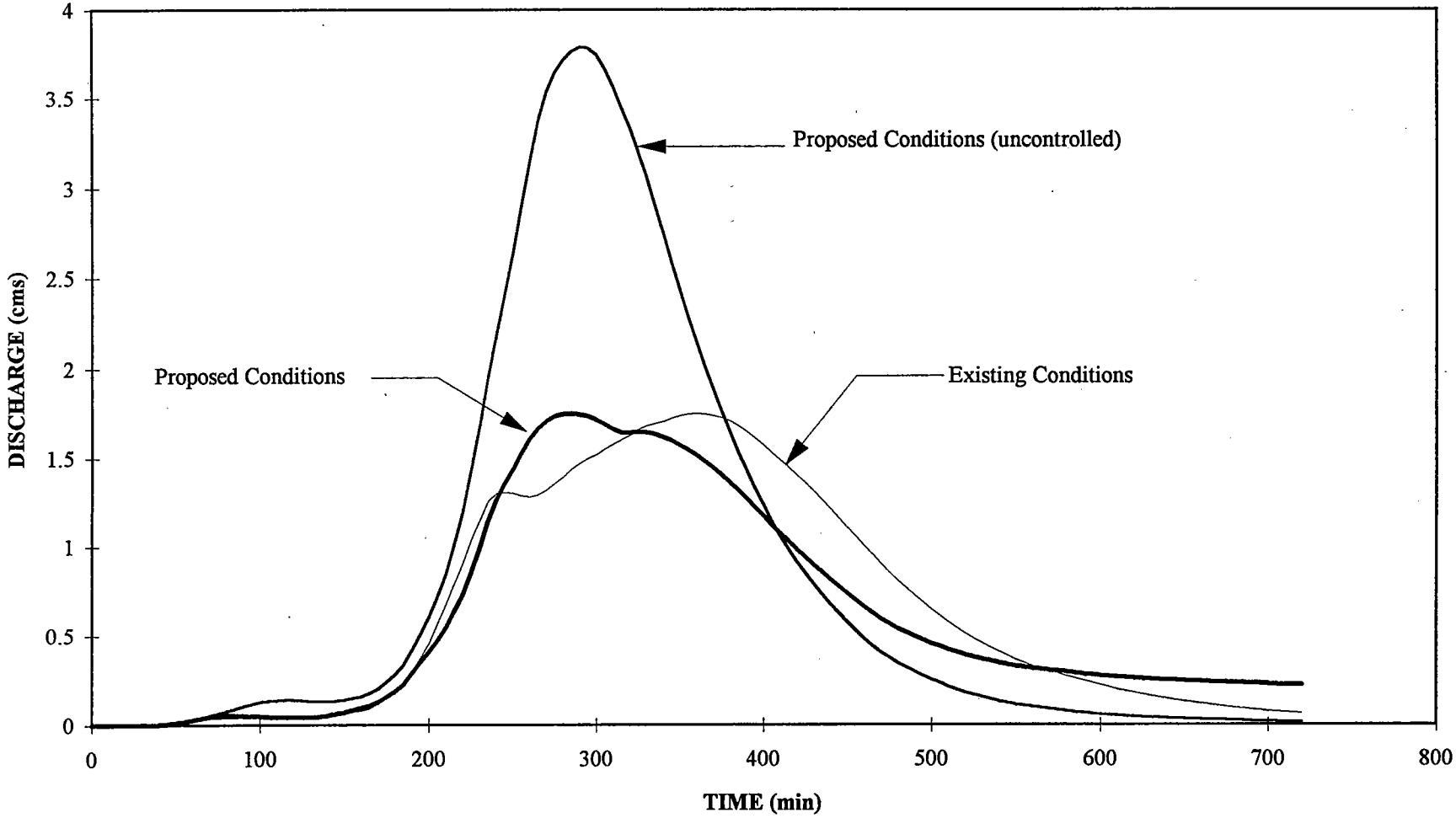
HYDROGRAPHS AT NODE 0
(1:2 YR ULTIMATE DEVELOPMENT)



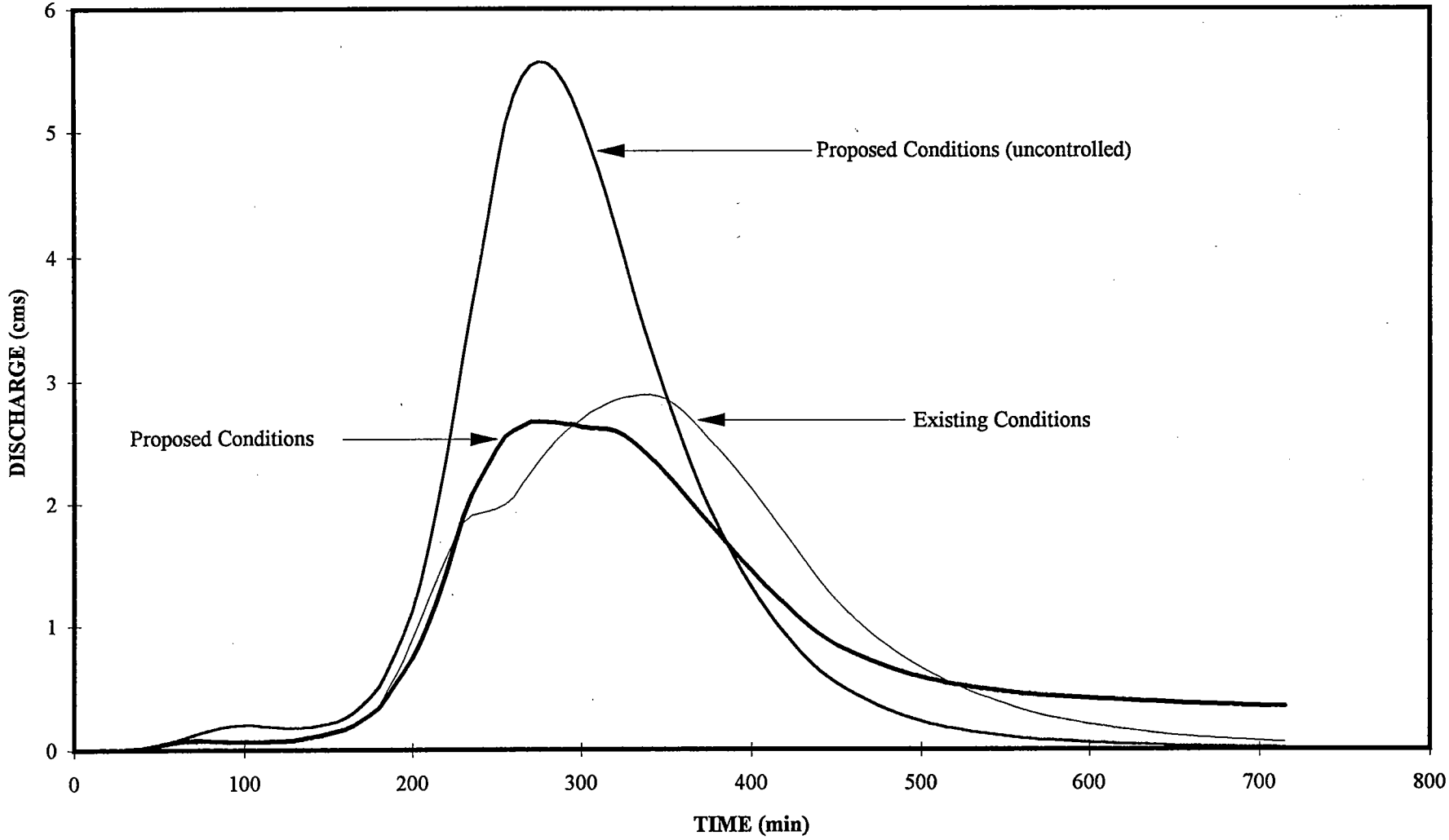
HYDROGRAPHS AT NODE 0
(1:5 YR ULTIMATE DEVELOPMENT)



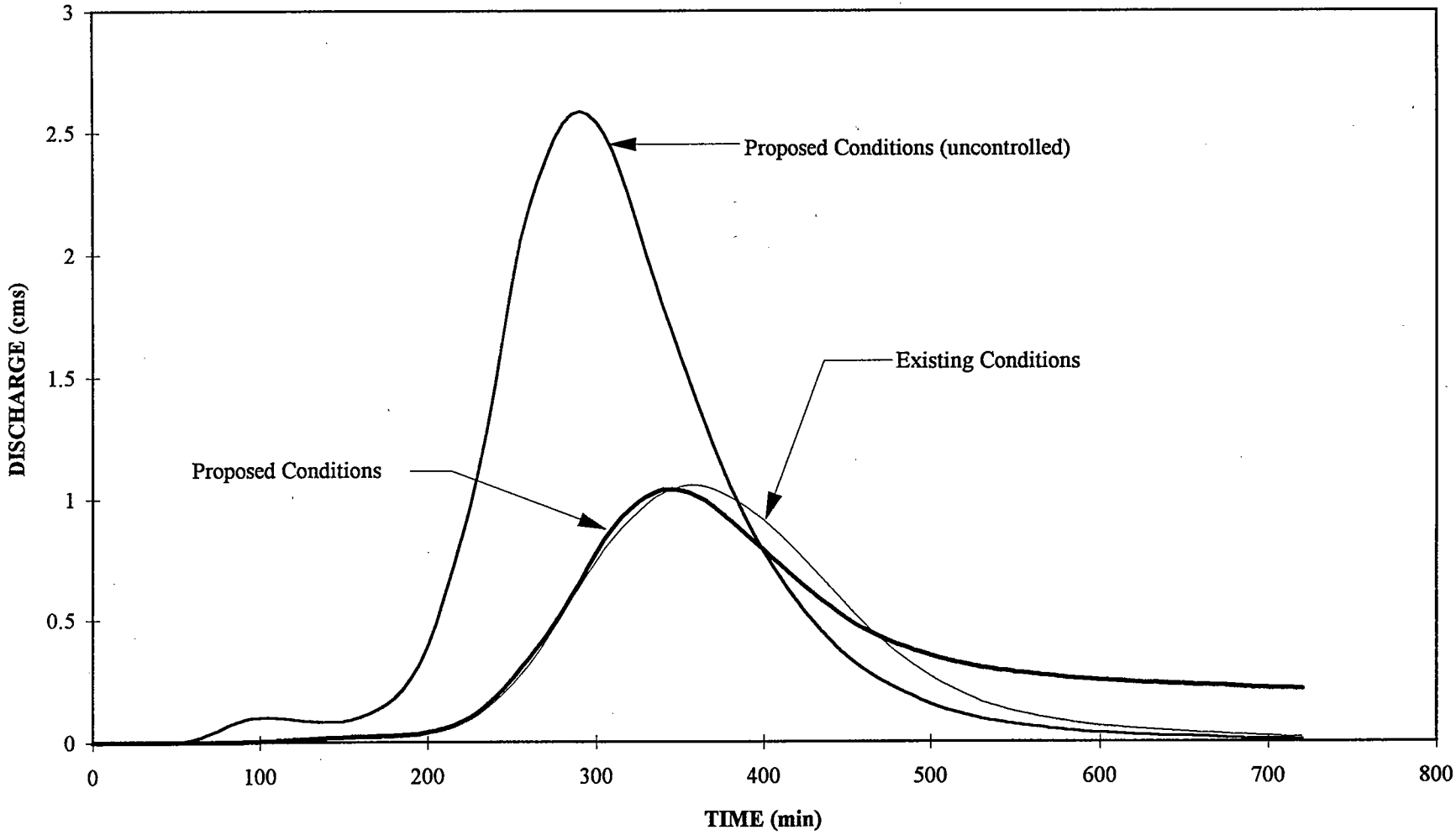
HYDROGRAPHS AT NODE 10
(1:2 YR ULTIMATE DEVELOPMENT)



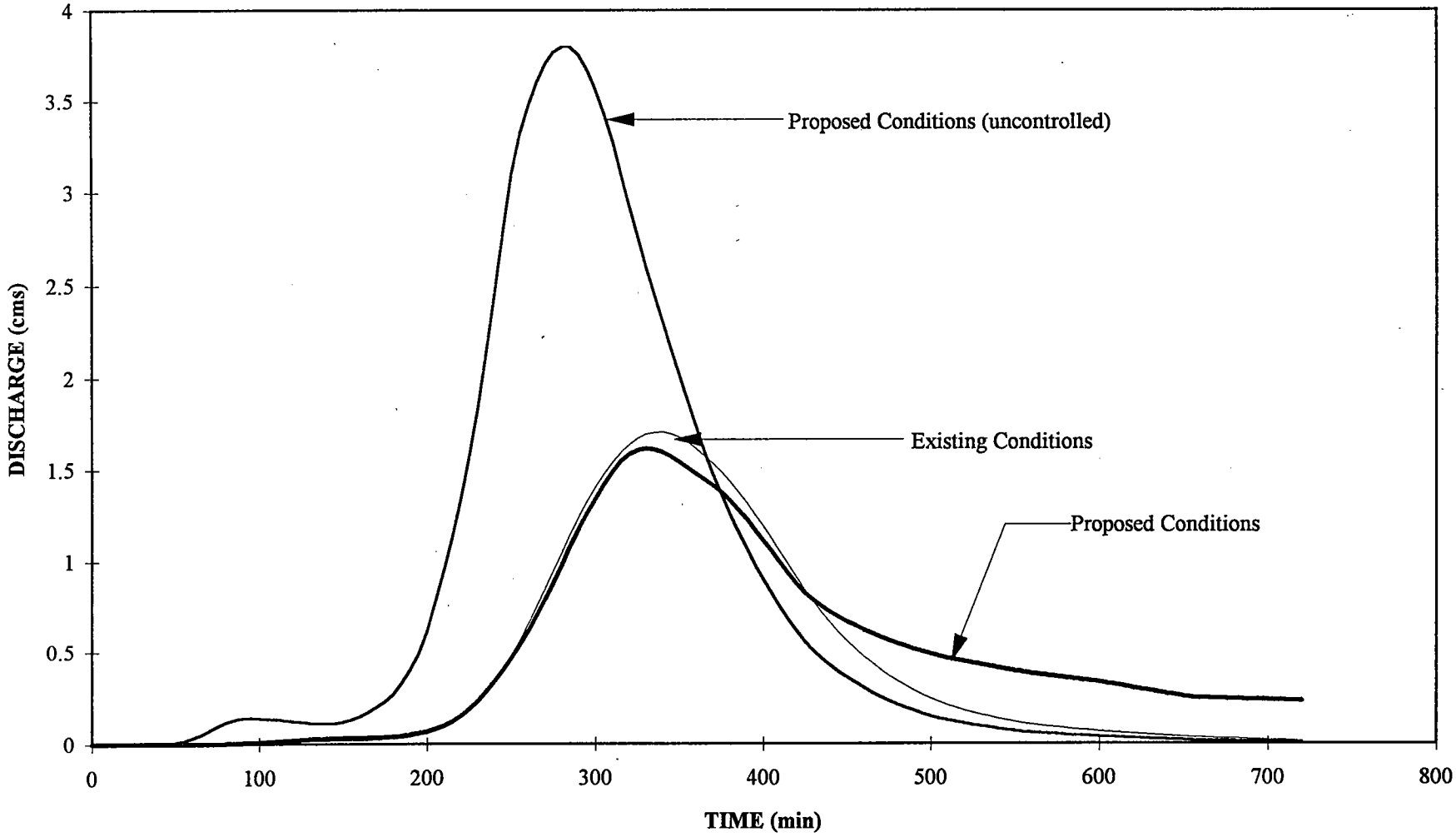
HYDROGRAPHS AT NODE 10
(1:5 YR ULTIMATE DEVELOPMENT)



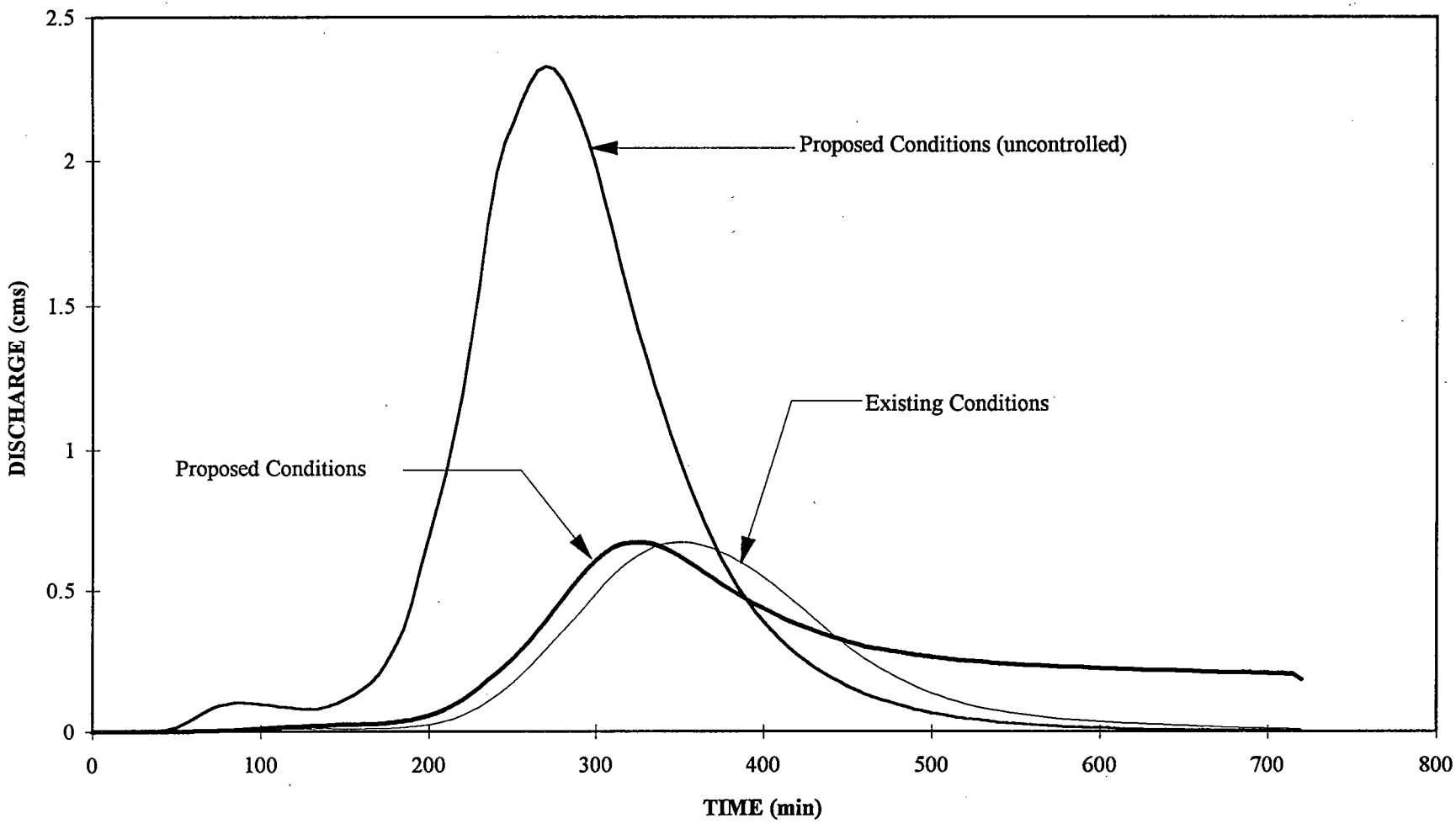
HYDROGRAPHS AT NODE 20
(1:2 YR ULTIMATE DEVELOPMENT)



HYDROGRAPHS AT NODE 20
(1:5 YR ULTIMATE DEVELOPMENT)



HYDROGRAPHS AT NODE 30
(1:2 YR ULTIMATE DEVELOPMENT)



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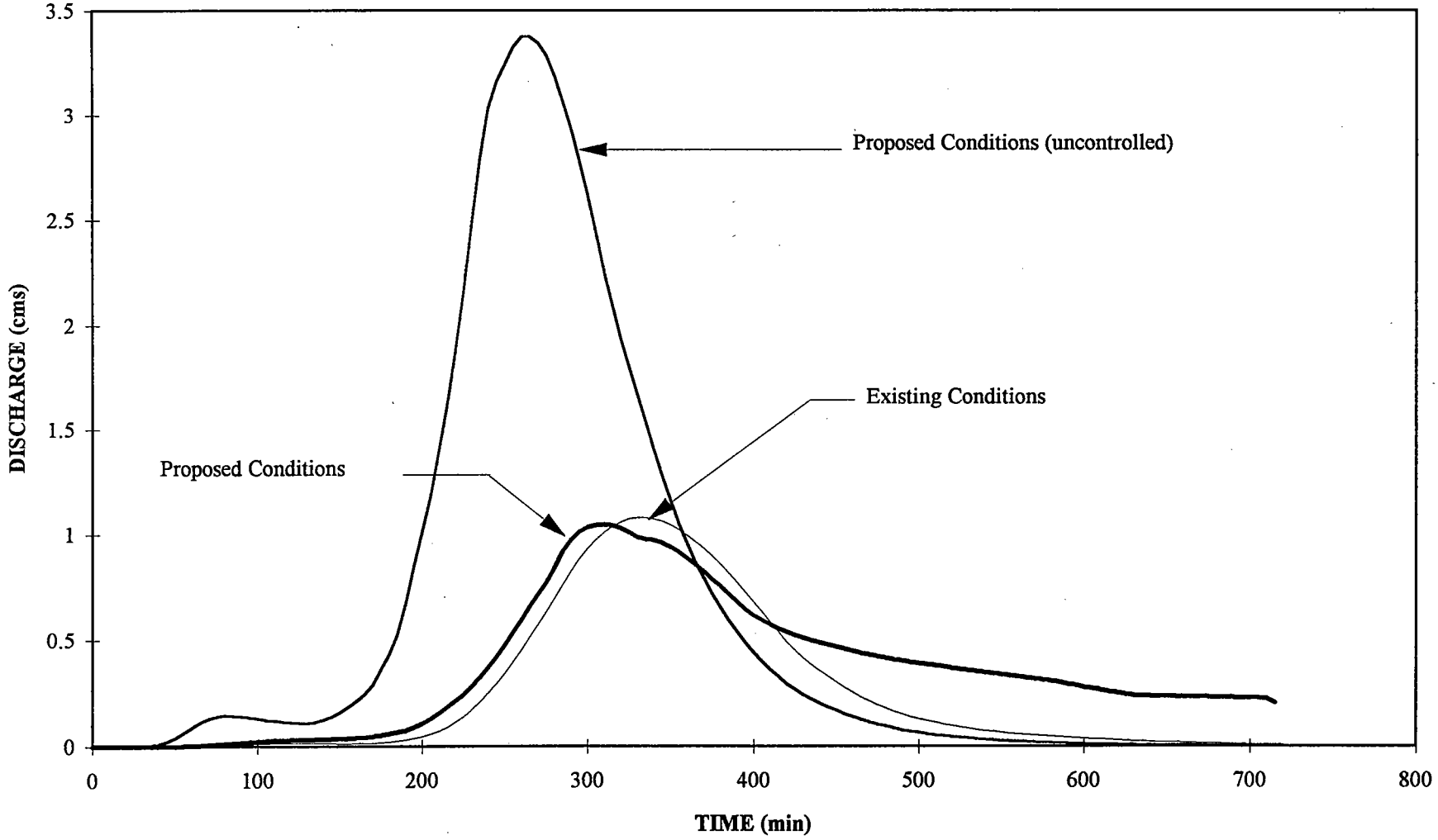
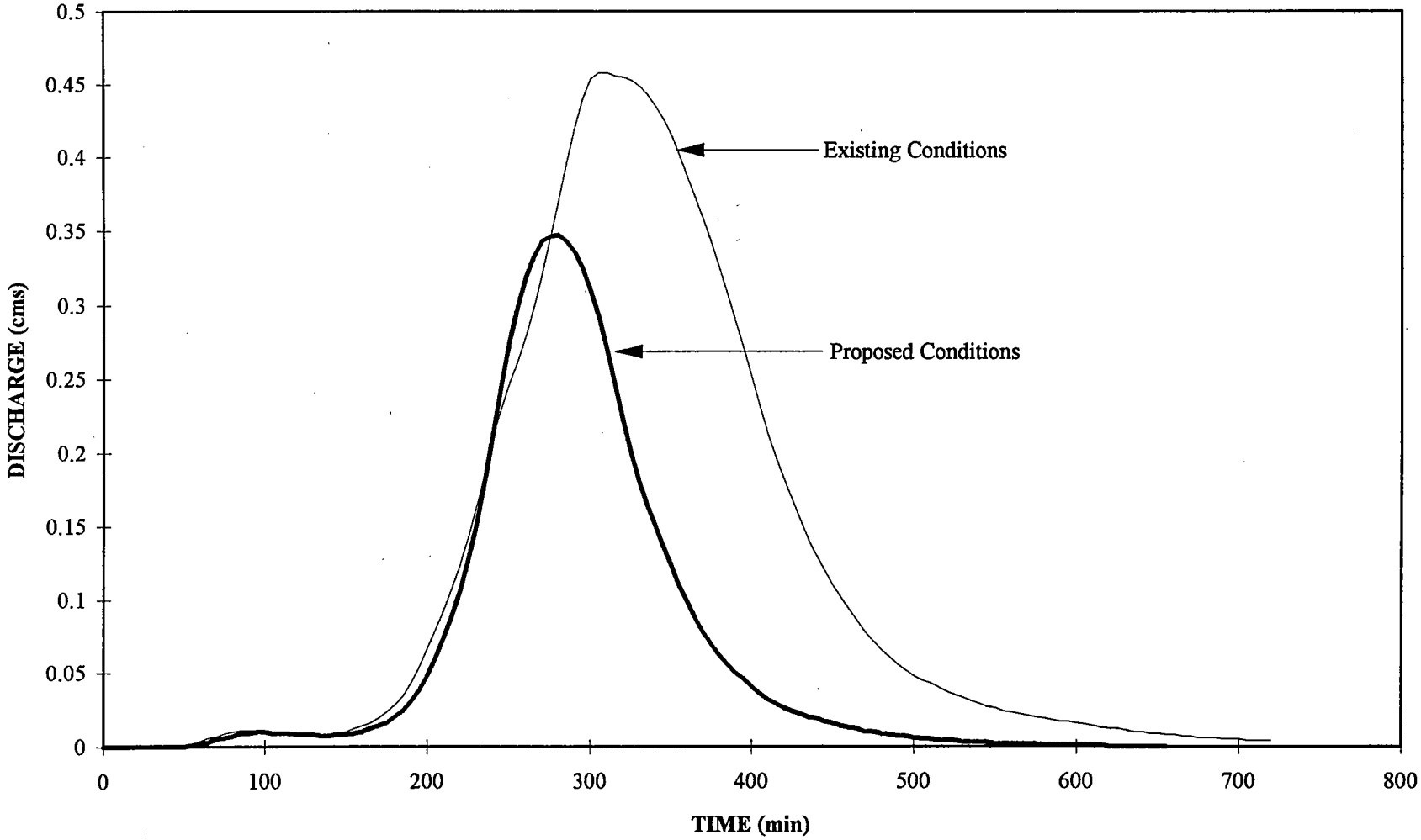
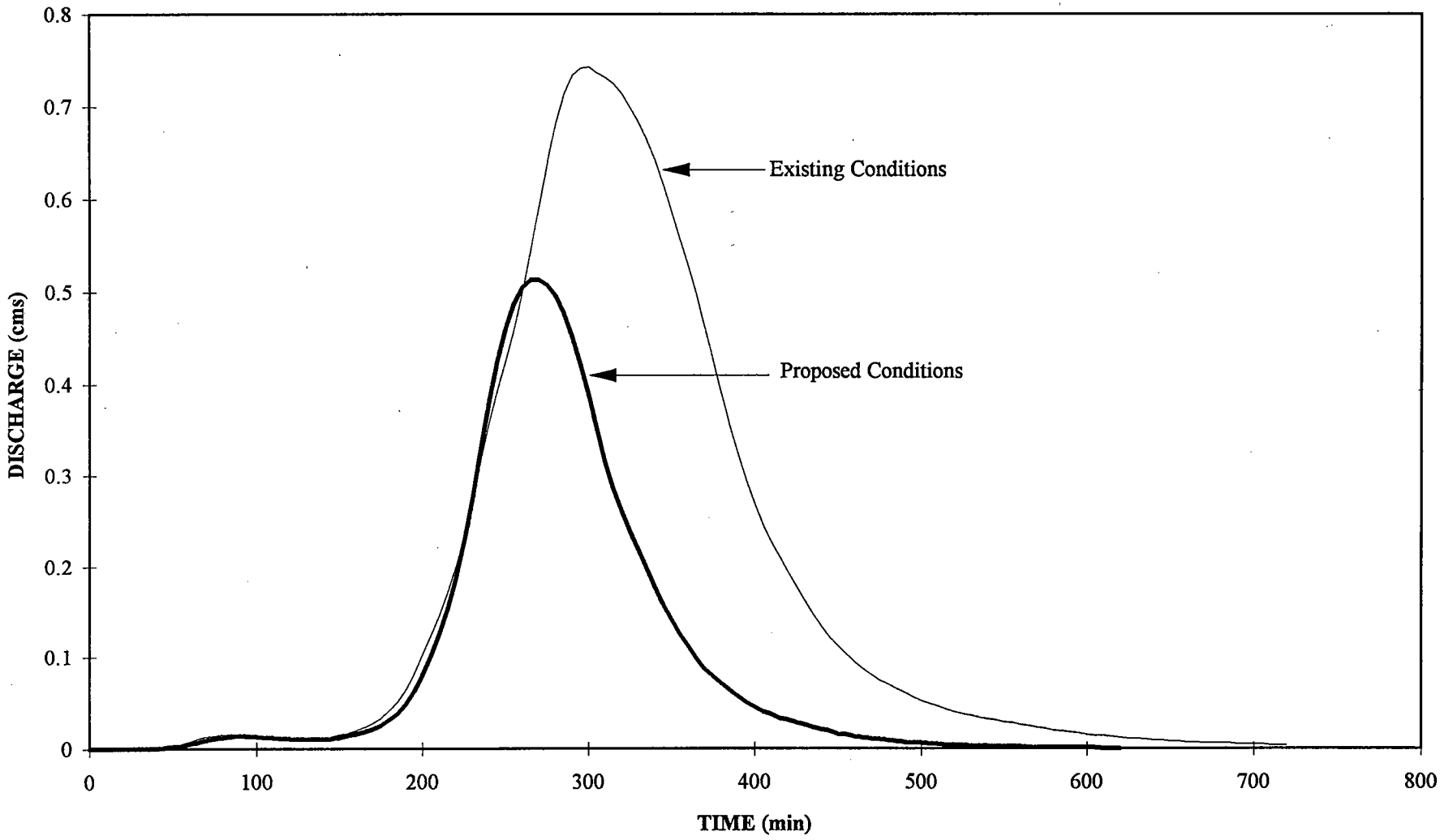
(1:5 YR ULTIMATE DEVELOPMENT)



HYDROGRAPHS AT NODE 40
(1:2 YR ULTIMATE DEVELOPMENT)



HYDROGRAPHS AT NODE 40
(1:5 YR ULTIMATE DEVELOPMENT)



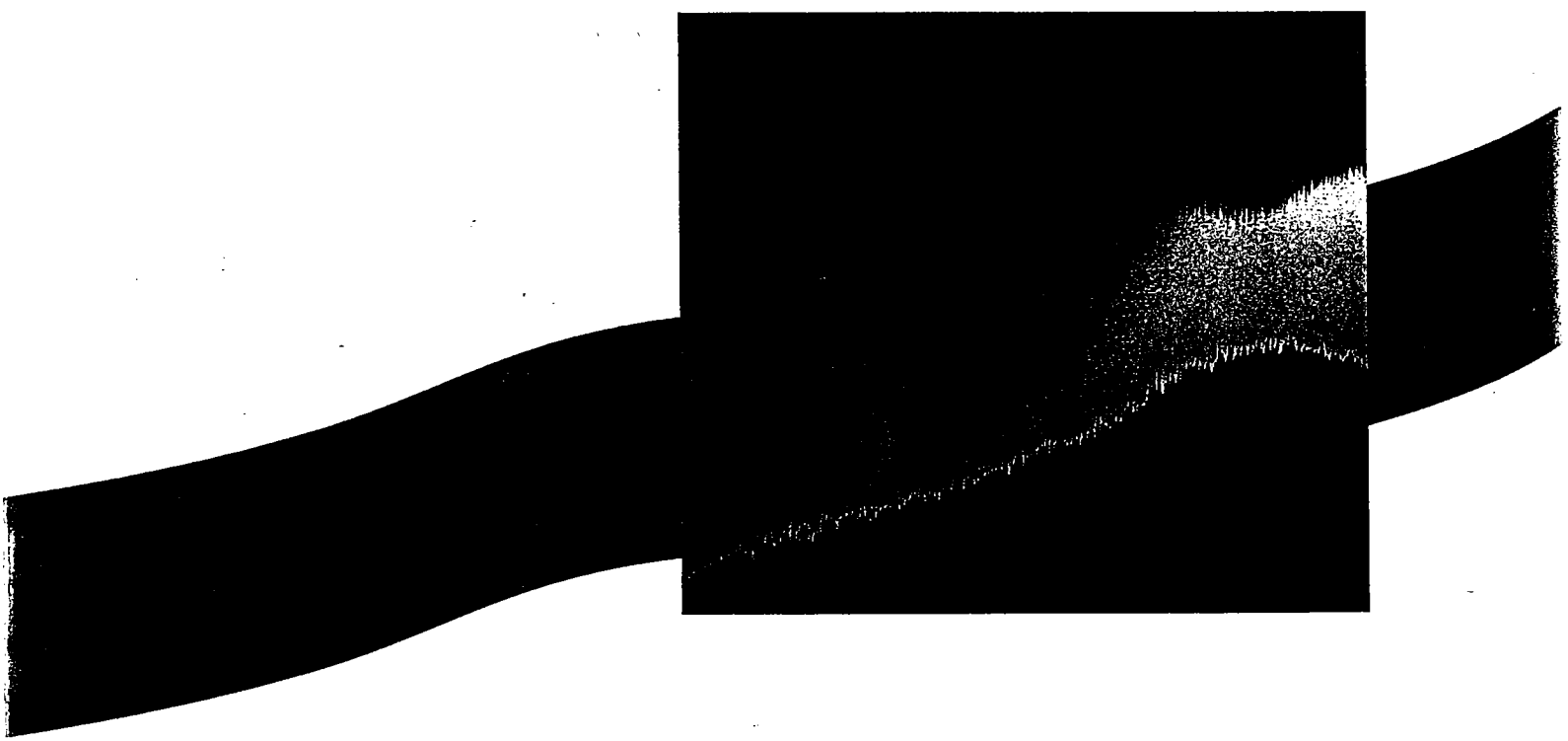
APPENDIX B

STORMCEPTOR BROCHURE

URBANSYSTEMS

February 1996

Stormceptor



COMBATS POLLUTION

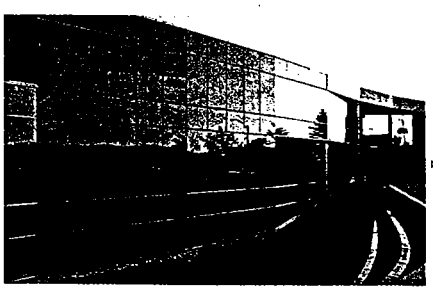
Stormceptor™ is a pollution prevention device that efficiently removes oil and sediment from stormwater, and stores them for safe and easy removal. Stormceptor™ is unique in the market because it will not release trapped pollutants between servicing, even in periods of peak water flow. As the Stormceptor™ storage chamber is air tight, it will also prevent air pollution from those volatile petroleum products that it traps. Designed to replace more costly conventional water quality inlets, and fully tested by Environment Canada's National Water Research Institute, Stormceptor™ offers other benefits beyond front-line pollution control.

LOWERS COSTS

When installed in new or existing storm sewers, Stormceptor™ eliminates the need for catch basin sediment traps, and reduces the frequency of scheduled sewer flushing.

Stormceptor™ is available in models designed for private and public usage.

Where land is at a premium, Stormceptors™ can take the place of conventional stormwater quality ponds, and by intercepting and containing accidental spills, can ensure fast, efficient clean ups.



Localized containment eases both the identification of polluters, and the transfer of cleanup liability to them, instead of the municipality.

East Newton Neighbourhood Concept Plan

Stage II Stormwater Drainage Report

URBAN SYSTEMS

June 1996
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1. Summary

This report is being submitted on behalf of the Steering Committee for the East Newton Neighbourhood Concept Plan. It is intended to supplement the information presented in the Stage I NCP report, submitted in June 1995.

The objective of this report is to summarize the effects of the proposed development on existing downstream drainage systems and to present a conceptual design for a drainage and stormwater management infrastructure. The intent of the system will be to prevent an increase in downstream flows and reduce the risk of flooding and erosion on downstream lands.

The overall drainage strategy is to convey the minor (1:5 year) stormwater runoff via storm sewers to a single wet pond detention facility located to the north east of the study area, which will attenuate the post-development peak flows of the 1:2 and 1:5 year storm events to their respective pre-development levels and provide pollutant removal prior to discharge into Bear (Mahood) Creek. Major flows would be conveyed on the ground surface, primarily employing roadways to direct the runoff to Bear Creek.

The total catchment area of the NCP is approximately 128.1 hectares (ha). The total tributary area to the community pond is 89.4 ha. Currently an area of 37.6 ha drains undetained into a westerly tributary of Bear Creek at 76th Avenue and Wiltshire Drive. It is proposed that 20.9 ha of this catchment be diverted to the community pond. The remaining 16.7 ha will drain undetained into Bear Creek. The net effect during the 5 year storm event is a reduction of flow in the tributary to Bear Creek and to Bear Creek itself at this location.

Another basin of 107 ha is currently draining undetained to Bear Creek through a series of storm sewers on 76th Avenue and 152nd Street. Again, by diverting some of the catchment the new undetained area will be 59.8 ha. The net effect on Bear Creek through the use of the community

pond will be attenuation of the post-development peak flows of the 1:2 and 1:5 year storm events to pre-development levels.

Hydrologic modelling confirms that under ultimate development conditions a single communal detention facility, located to the north east of the study area, is sufficient to meet the criteria of "no net increase" of stormwater peak flow for minor events (1:5 year and less) at all discharge locations to Bear Creek from the NCP. However, if development were to proceed prior to the construction of the pond and trunk storm sewer, interim detention would be required at each development site.

The community pond is necessary when 20-30% of the catchment has been developed. This is based on the initial 20-30% providing interim on-site detention until the community pond is operational.

It is proposed that an additional 10% of the drainage catchment, which is tributary to the 76th Avenue trunk, be allowed to temporarily drain undetained into the existing lowland ditch along 152nd Street and into Bear Creek. The existing 76th Avenue trunk has excess capacity to allow the catchment to drain eastward. The existing drainage south of 76th Avenue and east of the unnamed tributary is currently flowing undetained into the 76th Avenue system. The grades and conditions of the ditches from 76th Avenue/152nd Street to Bear Creek can accept this small undetained area with minimal impact.

Bear Creek at approximately 152nd Street/76th Avenue is tidally influenced. During significant storm events the water level in Bear Creek at this location is high due to the level of the Serpentine River and the large flow from Bear Creek. Any flooding in the Bear Creek floodplain at 152nd Street is minimally mitigated by detention. The typical detention criteria applied to control flows delays the peak flow but it does not retain the flow for discharge following the storm event. Therefore the impact of detention on the larger flooding issue in the Serpentine River/Bear Creek floodplain is minimal.

Interest has risen amongst the developers to construct finished basements within the NCP area. However, in order to permit finished basements, the 1:100 year HGL must be lowered below the proposed minimum basement elevations (MBE), in accordance with City standards. Two options exist

which would achieve this objective. The first option would be to design the sewer infrastructure to convey the 1:100 year runoff rates, which will ensure the HGL remains within the pipe. The second option is to construct a Third Pipe System, which involves a twin sewer pipe dedicated solely to foundation drain connections. The primary storm sewer system would remain as a 1:5 year system, while the Third Pipe network would be primarily made up of 150 mm piping. Preliminary cost estimates indicate that the Third Pipe System would cost approximately 5 percent more than sizing the system for the 1:100 year storm.

In addition to implementing storm sewers and detention facilities, a number of off-site mitigative measures and Best Management Practices should be implemented to ensure stormwater quality is maintained at the pre-development level or enhanced prior to discharging stormwater into Bear Creek.

2. Introduction

This report has been prepared as part of the Neighbourhood Concept Plan, Phase II Report for the East Newton study area. The premise for this report is the proposed land use strategy presented in the Phase I Report.

The objective of this report is to summarize the effects of the proposed development on downstream drainage systems and to present a conceptual design for a drainage and stormwater management system which will prevent an increase in downstream flows, reduce the increased risk of flooding and erosion on downstream lands, as well as address environmental and water quality issues.

2.1 Study Area

In order to fully assess the effects of drainage on the receiving watercourse, the study area boundaries for this report extend beyond the NCP area boundaries. The boundaries for this report are limited by 72nd Avenue to the south, 144th Street to the west, and Bear (Mahood) Creek to the north and east, as shown on Figures 2 and 4.

The study area currently drains into Bear Creek at four locations:

- Tributary northeast of 76th Avenue and 144th Street
- Guilford Golf Course Drainage Creek
- Drainage channel running east from 152nd Street opposite 75th Avenue
- Drainage channel running east from 152nd Street opposite 73rd Avenue

In the future condition discharge from the detention facility will result in a fifth discharge point.

3. Methodology

As stipulated in the previous section, the prime objective is to ensure that the proposed development does not increase the risk to downstream flooding and erosion. In order to assess the impact development may have on the drainage system, hydrologic modelling was performed employing the MIDUSS 4.72.1 (Smith, 1993) package to analyze the drainage characteristics of both the existing conditions and the proposed development conditions in the NCP.

The primary constraint of the proposed drainage system is to regulate the post-development peak flows to pre-development levels at all discharge locations into Bear Creek for both the 1:2 year and 1:5 year design storm events. The major drainage system will be designed to safely convey the runoff occurring from the 1:100 year storm event without posing risk to flooding of private property.

3.1 Design Rainfall

The location of the study area lies approximately equidistant from the Surrey Municipal Hall and Kwantlen Park weather stations. Therefore, rainfall values were computed for the study area by averaging the IDF coefficients of the two weather stations which were obtained from the Atmospheric Environment Service. A summary of the design rainfall computation is shown in Figure 1.

Figure 1

EAST NEWTON NCP

DESIGN RAINFALL COMPUTATIONS

IDF Curve Equation: **PPT = A*T^(1+B)**

where: PPT = Total rainfall (mm)
A = AES coefficient
B = AES coefficient
T = Storm duration (hours)

SURREY MUNICIPAL HALL

Return Period (Yrs)	2	5	100
Coefficient A	10.5	14.8	25.7
Coefficient B	-0.475	-0.549	-0.629

File Code	T (hrs)	T (min)	PPT -Total Rainfall (mm)		
A	0.5	30	7.3	10.8	19.9
B	1	60	10.5	14.8	25.7
C	2	120	15.1	20.2	33.2
D	6	360	26.9	33.2	50.0
E	12	720	38.7	45.4	64.6
F	24	1,440	55.7	62.0	83.6
G	48	2,880	80.1	84.8	108.1

KWANTLEN PARK

Coefficient A	11.8	15.5	25.5
Coefficient B	-0.460	-0.485	-0.517

File Code	T (hrs)	T (min)	PPT -Total Rainfall (mm)		
A	0.5	30	8.1	10.8	18.2
B	1	60	11.8	15.5	25.5
C	2	120	17.2	22.1	35.6
D	6	360	31.1	39.0	60.6
E	12	720	45.1	55.7	84.7
F	24	1,440	65.6	79.6	118.4
G	48	2,880	95.4	113.8	165.4

AVERAGE VALUES

Return Period (Yrs)	2	5	100

A	0.5	30	7.7	10.8	19.1
B	1	60	11.2	15.2	25.6
C	2	120	16.1	21.2	34.4
D	6	360	29.0	36.1	55.3
E	12	720	41.9	50.6	74.6
F	24	1,440	60.7	70.8	101.0
G	48	2,880	87.8	99.3	136.7

3.2 Rainfall Distribution Patterns

Several storm durations were analyzed in order to assess the critical storm event as well as to determine the response of the proposed drainage system through various storm durations. For storm durations equal to or less than 6 hours, the Huff third quartile distribution was utilized, while for storms greater than 6 hours in duration, the SCS Type 1A distribution was used, as directed by City staff.

3.3 Land Use Categories

Several land use categories have been identified in the NCP which represent general development conditions. The following designations have been established to describe the study area in both the existing and proposed conditions:

- ACRGE - Rural Acreage (rural roads, 2 units or less per hectare)
- RSTRC - Restricted Residential (approximately 12 units per hectare)
- SFRES - Single Family Residential (approximately 5 units per hectare)
- MDRES - Medium Density Residential (approximately 17 units per hectare)
- HDRES - High Density Residential (greater than 20 units per hectare)
- TREED - Naturally treed
- GRASS - Meadow, parks, golf courses, etc.
- PAVED - Large paved areas such are parking lots, industrial/ commercial areas

Section five of the NCP Phase I report describes the land use patterns for the study area and describes the land use strategy for each catchment of the study area. The catchment descriptions in this study are reflective of the NCP Phase I Report.

3.4 Rainfall Losses

The SCS Curve Number (CN) method has been selected to calculate the rainfall losses due to infiltration. Curve numbers have been selected for each development condition which represent both the average surface cover condition as well as the sub-surface geology.

Soils mapping indicates that the study area is characterised by hydrologic soils groups C and D for which the dividing line is also shown in Figures 2 and 4. Curve numbers have been selected for antecedent moisture condition (AMC) III, which represents saturated spring/winter conditions. These values have been chosen in accordance with the City of Surrey development guidelines.

The initial abstraction values have been internally calculated by the MIDUSS model based on the relationship of IA = 0.2S, where S is the potential storage within the soils and is a direct function of the curve number. The sensitivity of the model to the initial abstraction is relatively low, as it only effects the very initial stages of the rainfall event.

The impervious fraction for each development condition has been divided into the portion which is "directly connected" to the storm sewer system (ie. runoff which does not pass over a pervious surface prior to entering the drainage network) and the portion which is not directly connected. Roof areas have been considered not directly connected. It is expected that roof leaders will discharge onto a landscaped surface and not directly into the drainage network.

4. Existing Conditions

Hydrologic modelling was performed for the existing conditions in order to establish the design constraints for the proposed drainage system. As described earlier, the constraint is to maintain the runoff peak flows for the 1:2 and 1:5 year rainfall events to pre-development levels. Modelling of the existing conditions is therefore required to determine the level of control required for the proposed development.

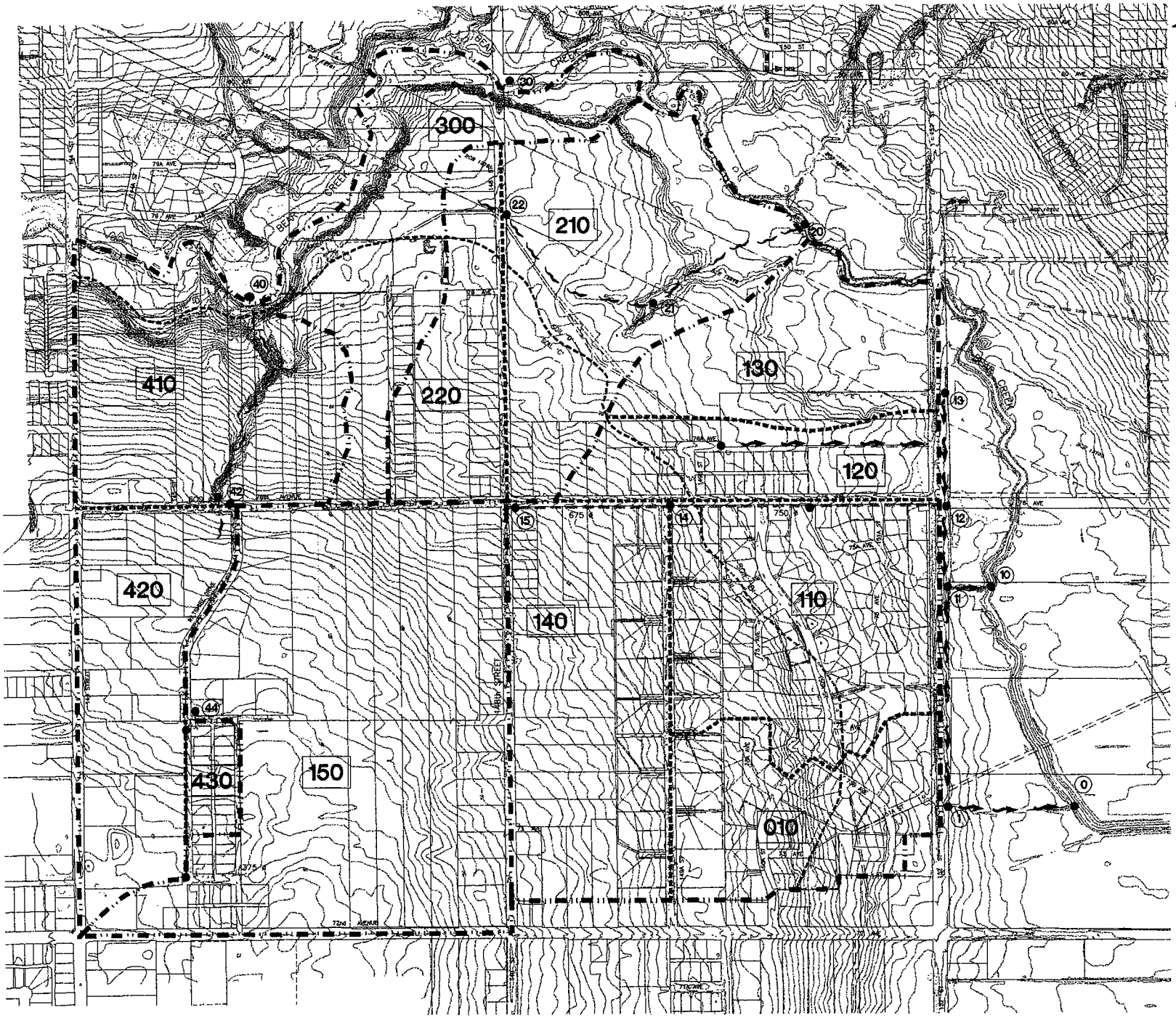
Five discharge points along Bear Creek have been identified as the control points for the overall drainage strategy. It is these points at which the "no net increase" in stormwater peak discharge criteria is to be met.

The study area has been divided into five primary basins which describe the areas draining to each of the five discharge points. The primary basins have been subdivided further into a total of 12 catchment areas which are reflective of the development conditions and basin configurations. Figure 2 presents the catchment areas under the existing conditions, while Figure 3 shows a modelling schematic for the existing conditions.

Table 1 presents the existing land use allocations and shows a breakdown of the surface area conditions for each catchment. In addition, the table indicates the modelling parameters selected for each of the development conditions. The weighted runoff parameters were computed in two steps. First, the values were weighted strictly on the basis of the land use distribution. And secondly, for those catchments which contained both group C and D soils, a second weighting was performed based on the soils group areas.

Table 2 presents a summary of existing areas by hydrologic soils group for each catchment and indicates the overall weighted curve numbers and manning's "n" values selected for the modelling.

Table 3 presents all modelling parameters used to describe each catchment area in the existing condition. Modelling results of the existing condition will be discussed in Section 6.



EAST NEWTON
NEIGHBOURHOOD CONCEPT PLAN

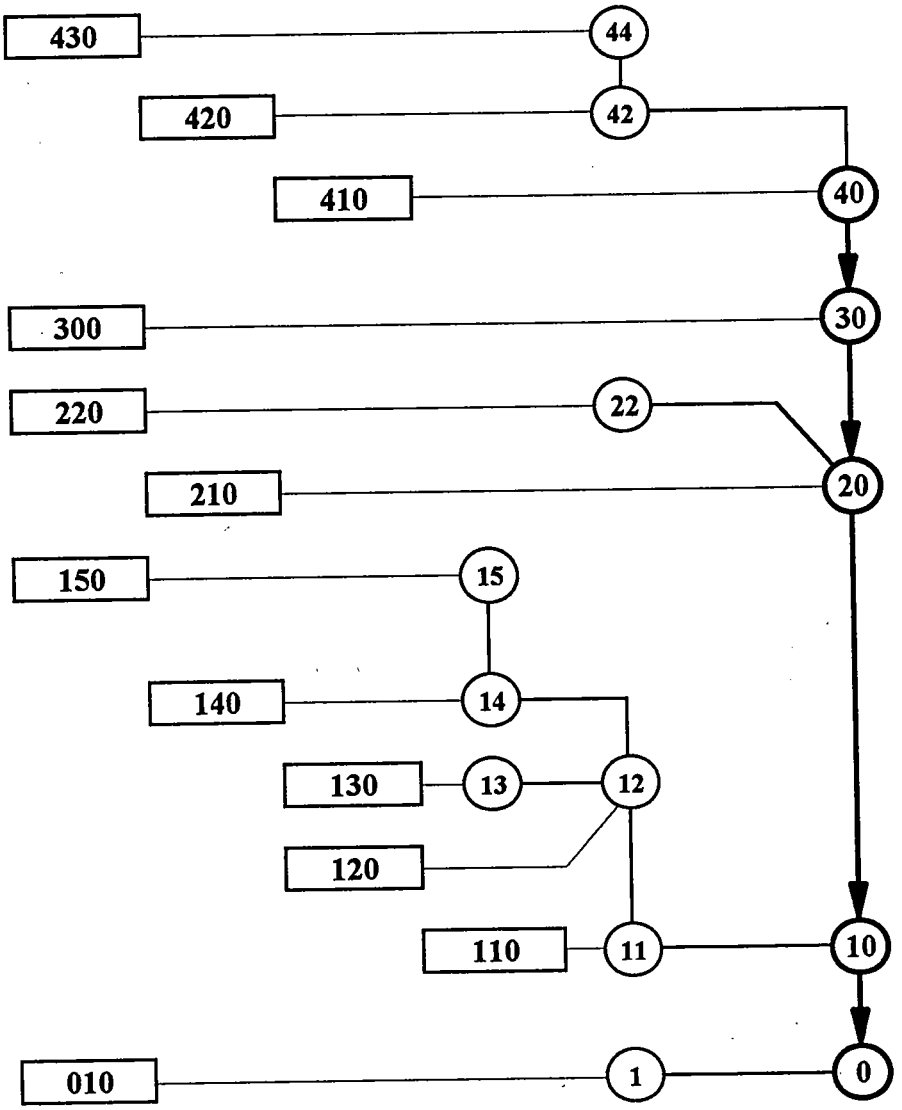
STORMWATER DRAINAGE PLAN
EXISTING CATCHMENTS

URBAN SYSTEMS

Fig. No. 2

Figure 3

MIDUSS MODELLING SCHEMATIC
EXISTING CONDITIONS



LEGEND

Catchment number

Internal node

Bear Creek node

Bear Creek

Minor routing (pipe or channel)

Table 1

EAST NEWTON NCP
EXISTING LAND USE ALLOCATIONS

BASIN	AREA (hectares)											
	GRASSED	TREED	PAVED	ACREAGE	SFR	RSFR	MDR	HDR	TOTALS	PERVIOUS	DC -IMP	NDC-IMP
430	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	1.0	0.4	0.6
420	4.1	0.0	0.9	11.7	0.0	0.0	0.0	0.0	16.7	12.9	1.4	2.4
410	0.0	13.2	0.0	7.7	0.0	0.0	0.0	0.0	20.9	19.0	0.4	1.5
300	4.3	15.6	0.0	1.0	0.0	0.7	0.0	0.0	21.6	21.0	0.2	0.4
220	2.4	4.0	0.0	0.8	2.0	1.1	0.0	0.0	10.3	8.8	0.6	0.9
210	27.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.5	27.5	0.0	0.0
150	3.1	28.4	0.0	14.7	0.5	2.7	0.0	0.0	49.4	44.2	1.4	3.9
140	3.2	3.6	0.0	8.1	8.4	1.2	0.0	0.0	24.5	18.5	2.2	3.7
130	12.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	12.8	12.8	0.0	0.0
120	4.3	0.0	0.0	3.1	0.0	2.0	0.0	0.0	9.4	7.6	0.6	1.2
110	0.0	0.0	0.0	0.0	23.7	0.0	0.0	0.0	23.7	14.2	4.5	5.0
010	0.0	0.0	0.0	0.0	13.5	0.0	0.0	0.0	13.5	8.1	2.6	2.8
TOTALS	**61.1**	**65.4**	**0.9**	**47.1**	**48.1**	**9.7**	**0.0**	**0.0**	**232.3**	**195.5**	**14.3**	**22.5**

PERCENT IMPERVIOUS (TOTAL)							
0	0	100	25	40	50	60	65

PERCENT IMPERVIOUS (DIRECTLY CONNECTED)							
0	0	95	5	19	20	27	35

PERCENT IMPERVIOUS (NON-DIRECTLY CONNECTED)							
0	0	5	20	21	30	33	30

SCS CURVE NUMBERS*							
91/93**	87/92	99/99	91/93	91/93	91/93	91/93	91/93

MANNING "n"							
0.40	0.60	0.015	0.35	0.25	0.25	0.25	0.25

* - Only the pervious CN are indicated as the basins have been modelled with the directly connected impervious areas seperated.

** - Soils Groups C/D (all values are for AMC III as per Surrey standards)

Table 2

EAST NEWTON NCP
EXISTING HYDROLOGIC SOILS CONDITIONS

BASIN	AREA (ha) SOIL C	SOIL C WEIGHTE CN	AREA (ha) SOIL D	SOIL D WEIGHTED CN	OVERALL WEIGHTED CN*	WEIGHTED MANNING n*
430	2.0	94	-	-	94	0.16
420	16.7	92	-	-	92	0.31
410	17.8	89	3.1	93	90	0.49
300	7.7	88	13.9	93	91	0.53
220	8.8	90	1.5	93	90	0.42
210	5.9	91	21.6	92	92	0.40
150	49.4	89	-	-	89	0.47
140	24.5	92	-	-	92	0.31
130	-	-	12.8	93	93	0.18
120	3.1	93	6.3	94	94	0.33
110	10.2	93	13.5	95	94	0.41
010	8.5	93	5.0	95	94	0.18

* - Weighted CN and n values are computed based on the land use allocations shown in Table 1.

Table 3

EAST NEWTON NCP

MODELLING PARAMETERS - EXISTING CONDITIONS

BASIN	AREA (ha)	PERVIOUS LENGTH (m)	GRADE (%)	PERCENT* IMP.	IMPERV. LENGTH (m)	MANNING (n)	CN	IA** (mm)
430	2.0	45	3	20.0	45	0.16	94	3.24
420	16.7	240	3	8.6	240	0.31	92	4.42
410	20.9	270	8	1.8	270	0.49	90	5.64
300	21.6	220	4	0.9	220	0.53	91	5.02
220	10.3	160	6	6.2	160	0.42	90	5.64
210	27.5	350	5	0.0	350	0.40	92	4.42
150	49.4	650	5	2.8	50	0.47	89	6.28
140	24.5	300	5	9.1	300	0.31	92	4.42
130	12.8	325	3	0.0	325	0.41	93	3.82
120	9.4	45	3	5.9	45	0.33	94	3.24
110	23.7	50	6	19.0	50	0.18	94	3.24
010	13.5	50	6	19.0	50	0.18	94	3.24

* - Only the directly connected portion of the impervious area is shown.

** - Initial abstraction has been computed based on IA=0.2*S.

5. Proposed Conditions

The proposed development will contain a wide mix of conditions, ranging from acreage residential to high density residential and institutional. This broad range of development conditions creates a wide range of hydrologic runoff characteristics.

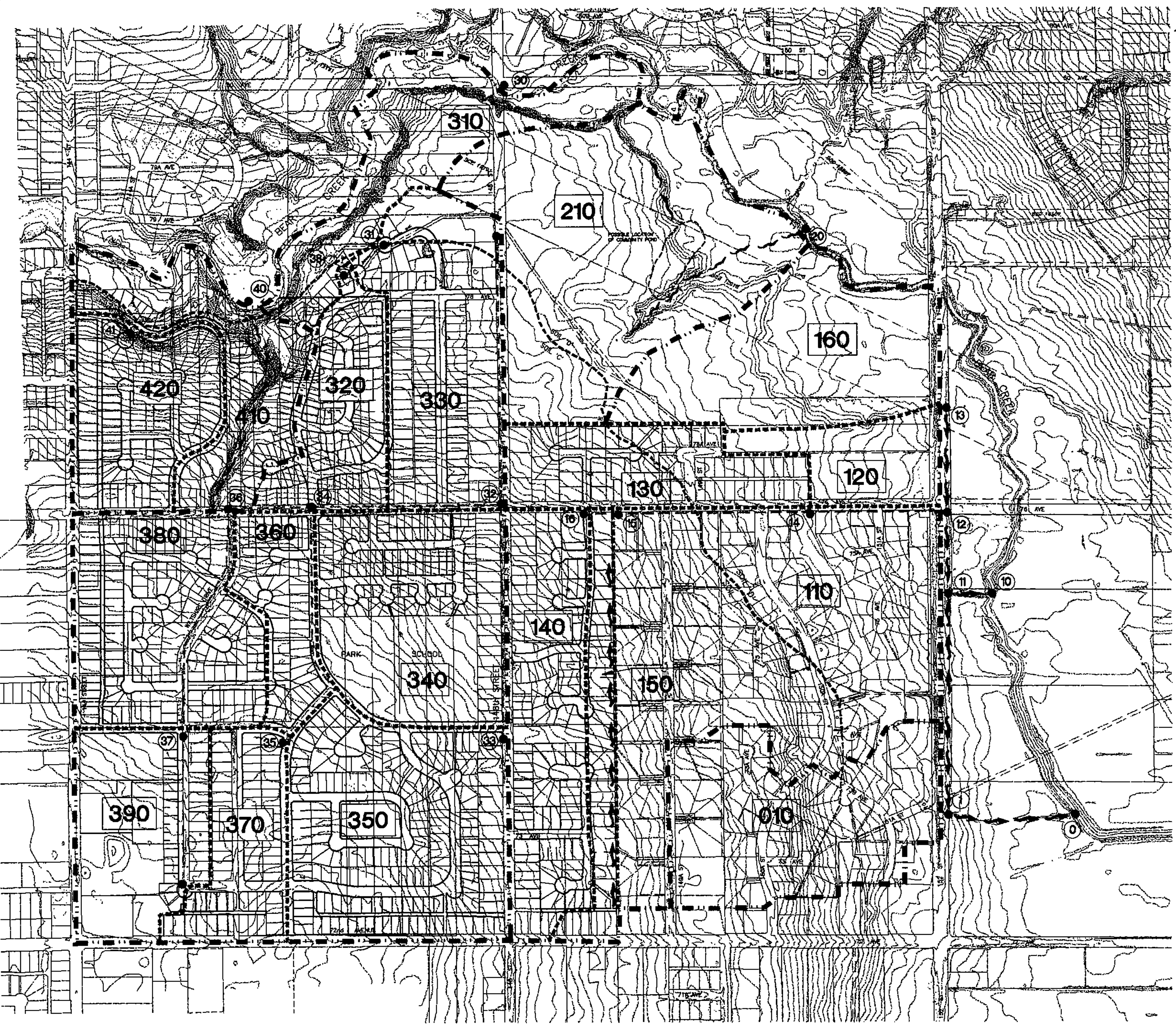
As with the existing conditions, the study area has been divided into five primary basin areas, which identify the lands draining to each of the five discharge points of Bear Creek. The five discharge points remain unchanged from the existing conditions modelling, however the boundaries of the primary basins have changed to reflect the proposed land use plan and drainage patterns.

The primary basins have been further subdivided into nineteen catchment areas which better describe the various land uses and basin configurations. Due to the wide range and distribution of the various development conditions, it was impractical to create individual catchment areas for each condition. Hydrologic modelling parameters were therefore computed by taking weighted values for each development condition within the catchment and combining them to create a single value which best represents the entire catchment. Figure 4 presents the post-development catchment areas, while Figure 3 shows a modelling schematic of the proposed conditions.

Under existing conditions the majority of lands south of 76th Avenue drain east along 76th to 152nd Street. However, the proposed drainage network will divert this runoff north along 148th Street to the proposed communal detention facility. By diverting this runoff north, the stormwater management objectives can be met through a single control facility. Development east of 148th Street will be permitted to discharge uncontrolled to 152nd Street by sufficiently overcontrolling the communal detention facility to compensate.

EAST NEWTON
NEIGHBOURHOOD CONCEPT PLAN

STORMWATER DRAINAGE PLAN
PROPOSED CATCHMENTS



LEGEND

- SUB BASIN BOUNDARY
- CATCHMENT BOUNDARY
- OVERLAND FLOW
- NATURAL WATERCOURSE
- NODE POINT AND NUMBER
- CATCHMENT NUMBER
- STORM SEWER

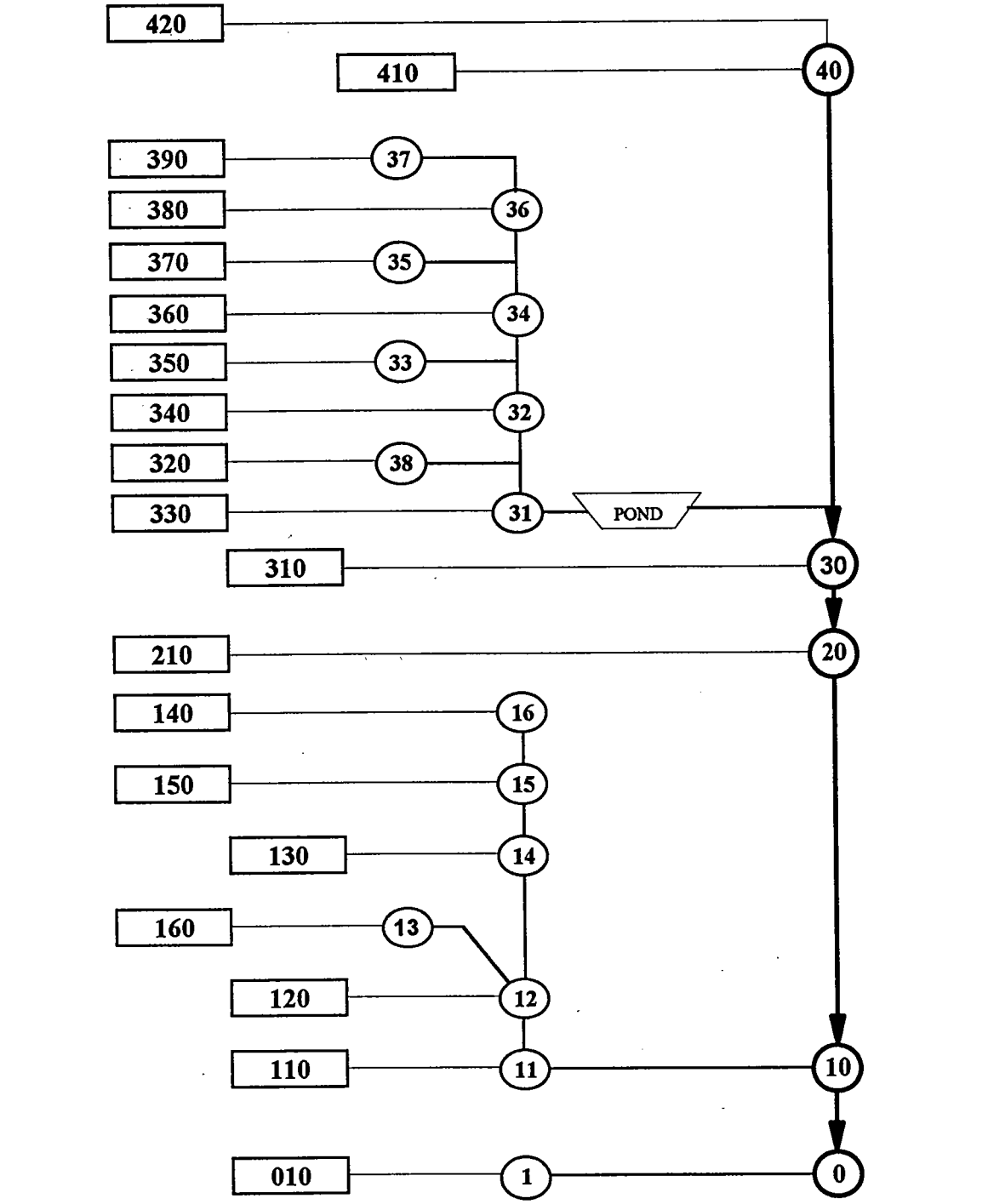
0 100 200 300

URBAN SYSTEMS

Fig. No. 4

Figure 5

MIDUSS MODELLING SCHEMATIC
PROPOSED CONDITIONS



LEGEND

Catchment number

Internal node

Bear Creek node

Bear Creek

Minor routing (pipe or channel)

Developments south of 76th Avenue and west of Wiltshire Drive, which currently drain to the Bear Creek tributary, will also be diverted east to the detention facility. By diverting this large area away from the tributary, development north of 76th Avenue (NCP plan area A-1) can discharge directly to Bear Creek without peak flow attenuation. Based on the proposed land use of this area it is not anticipated that uncontrolled discharge will create any environmental hazards. However, in order to maintain base flows in the tributary, a 150 mm diameter drain is required from the 76th Avenue storm sewer to discharge directly into the tributary.

Table 4 presents a breakdown of the proposed land use allocations and also indicates the modelling parameters selected for each of the development conditions. The weighted runoff parameters were computed in two steps. First, the values were weighted strictly on the basis of the land use distribution. And secondly, for those catchments which contained both group C and D soils, a second weighting was performed based on the soils group areas.

Table 5 presents a breakdown of areas by hydrologic soils group and shows the overall weighted curve numbers and manning's "n" used to represent each catchment.

Table 6 presents all modelling parameters used to describe each catchment area in the proposed condition. Modelling results of the proposed condition are discussed in Section 6.

5.1 Interim Conditions

The City has indicated that up to 30 percent of the area may be developed prior to the construction of the communal detention facility. However, in order to satisfy the stormwater management criteria, interim control measures would be required. To reflect interim conditions the study area has been delineated into eight catchments, as shown in Figure 6. These catchments represent phasing areas for which practical stormwater control facilities can be implemented. Potential sites for control facilities have also been shown on this figure. Due to steep topography it appears difficult to locate a surface control facility for Catchment C. However, underground

Table 4

EAST NEWTON NCP
PROPOSED LAND USE ALLOCATIONS

BASIN	AREA (hectares)											
	GRASSED	TREED	PAVED	ACREAGE	SFR	RSFR	MDR	HDR	TOTALS	PERVIOUS	DC -IMP	NDC-IMP
420	0.0	0.0	0.0	0.0	1.9	8.0	0.0	0.0	9.9	5.1	2.0	2.8
410	3.5	3.3	0.0	0.0	0.0	0.0	0.0	0.0	6.8	6.8	0.0	0.0
390	0.0	0.0	0.8	0.0	4.6	0.0	0.0	5.5	10.9	4.7	3.6	2.7
380	0.0	0.0	0.0	0.0	3.3	10.4	0.0	0.0	13.7	7.2	2.7	3.8
370	0.0	0.0	0.0	0.0	0.0	7.8	0.0	0.0	7.8	3.9	1.6	2.3
360	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0	5.8	2.9	1.2	1.7
350	0.0	0.0	0.0	0.0	2.8	14.8	0.0	0.0	17.6	9.1	3.5	5.0
340	3.7	0.0	1.3	0.0	0.9	1.3	7.5	0.0	14.7	7.9	3.7	3.1
330	0.0	0.0	0.0	0.0	0.0	9.6	0.0	0.0	9.6	4.8	1.9	2.9
320	0.0	0.0	0.0	0.0	4.2	5.1	0.0	0.0	9.3	5.1	1.8	2.4
310	3.8	8.1	0.0	0.0	0.0	0.0	0.0	0.0	11.9	11.9	0.0	0.0
210	26.2	2.7	0.0	0.0	0.0	0.0	0.0	0.0	28.9	28.9	0.0	0.0
160	12.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	12.8	12.8	0.0	0.0
150	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0	0.0
140	0.0	0.0	0.0	0.0	1.5	12.4	0.0	0.0	13.9	7.1	2.8	4.0
130	0.0	0.0	0.0	0.0	2.0	5.5	0.0	0.0	7.5	4.0	1.5	2.1
120	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.3	0.0	0.0
110	0.0	0.0	0.0	0.0	31.1	0.0	0.0	0.0	31.1	18.7	5.9	6.5
010	0.0	0.0	0.0	0.0	13.5	0.0	0.0	0.0	13.5	8.1	2.6	2.8
TOTALS	**56.7**	**14.7**	**2.1**	**0.0**	**65.8**	**80.7**	**7.5**	**5.5**	**233.0**	**156.2**	**34.6**	**42.3**

PERCENT IMPERVIOUS (TOTAL)							
0	0	100	25	40	50	60	65

PERCENT IMPERVIOUS (DIRECTLY CONNECTED)							
0	0	95	5	19	20	27	35

PERCENT IMPERVIOUS (NON-DIRECTLY CONNECTED)							
0	0	5	20	21	30	33	30

SCS CURVE NUMBERS*							
91/93**	87/92	99/99	91/93	91/93	91/93	91/93	91/93

MANNING "n"							
0.40	0.60	0.015	0.35	0.25	0.25	0.25	0.25

* - Only the pervious CN are indicated as the basins have been modelled with the directly connected impervious areas seperated.

** - Soils Groups C/D (all values are for AMC III as per Surrey standards)

envirowest
ENVIRONMENTAL CONSULTANTS

June 19, 1995

Mr. Geoff Heu
Genstar Development Company
Pacific Region
Suite 104, 4585 Canada Way
Burnaby, B.C.
V5G 4L6

Dear Mr. Heu:

RE: RAPTOR SURVEY WITHIN THE EAST NEWTON NCP AREA, SURREY

ECL Envirowest Consultants Limited has performed a raptor/heron nest survey within the East Newton NCP 1 area, bounded generally by 144th Street to the west, 149th Street to the east, 72nd Avenue to the south, and Bear (Mahood Creek) to the north. The study area consists of mixed forests interspersed with cleared blocks of land. The upland areas tended to have higher proportions of deciduous species. Coniferous trees were more abundant along the Mahood Creek corridor. The survey was performed during the first week of April, 1995. Leaf growth on the coniferous trees was minimal at this time. The survey was performed in accordance with B.C. Environment's criteria for such surveys. A grid-search technique, consisting of parallel transects, was employed. Through coniferous tree cover the transects were spaced approximately 10 metres apart. Through the deciduous forest, high visibility permitted a wider transect spacing (up to 20 metres).

No raptor/heron nests were located within the study area. Red-tailed hawks were, however, observed soaring over the study area and perched within the neighbouring Guildford Golf Course.

Please call me should you require further information.

Yours truly,
ECL ENVIROWEST CONSULTANTS LIMITED

Original Signed By
IAN W. WHYTE

Ian W. Whyte
Senior Project Manager

IWW/

ECL ENVIROWEST CONSULTANTS LIMITED phone: (604) 521-6500
Suite 204 - 800 McBride Boulevard, New Westminster, B.C. Canada V3L 2B8 fax: (604) 521-2208

APPENDIX 2

Assessment of East Newton NCP Stormwater Drainage Report

Assessment of East Newton NCP Stormwater Drainage Report

envirowest
ENVIRONMENTAL CONSULTANTS

March 21, 1996

Urban Systems Ltd.
204 - 10711 Cambie Road
Richmond, B.C.
V6X 3G5

Attention: Mr. Martin Moseley, P.Eng.
Senior Engineer

Dear Mr. Moseley:

RE: EAST NEWTON NEIGHBOURHOOD CONCEPT PLAN
STAGE II STORMWATER DRAINAGE REPORT

ECL Envirowest Consultants Limited (Envirowest) has reviewed the drainage report for the East Newton NCP and we conclude that its recommendations are in general compliance with the *Land Development Guidelines for the Protection of Aquatic Habitat* (LDGs). Specific comments of our review follow.

- we note that stormwater runoff from some sub-basins of the NCP area would not be detained. However, by overcontrolling stormwater flow from other sub-basins the plan achieves the objective of controlling 2-year and 5-year post-development flows from the entire NCP area to their respective pre-development flows. This level of flow control exceeds those of the LDGs, which recommend control of the 2-year flows only.

- the relative sensitivity of the unnamed tributary to baseflow reduction is low since there are no fish inhabiting this stream, except the lowest section of the stream below the sanitary sewer alignment. However, baseflows would be maintained in the unnamed tributary by diversion of all low flows from a manhole at 76th Avenue. Roof leaders throughout the NCP area will be directed to splash pads or infiltration trenches to promote groundwater infiltration. Bear (Mahood) Creek is relatively insensitive to baseflow reduction from the NCP area, due to the large catchment area upstream of the NCP.

- a single, communal detention facility is proposed for the NCP area. It is to be located within the Guildford Golf Course, northeast of the NCP area. The pond would be located away from existing creeks, and would be designed to provide a water quality improvement function. In that regard, the pond has been sized to the objective level of

the LDGs (1.5 percent of the catchment area). The pond will also include a sediment cleanout sump, and be landscaped with appropriate aquatic and riparian vegetation.

- the City of Surrey will allow up to 30 percent of the NCP area to be developed before the communal detention facility is required, provided interim control facilities are built.

- In addition to the detention pond, other Best Management Practices (BMPs) are proposed. A variation of the standard oil-water separator, the "Stormceptor", is proposed for use within commercial and institutional parking facilities. A storm drain marking program would be undertaken. Detailed sediment and erosion control strategies would be required during construction within the NCP area.

Envirowest is in support of the stormwater management plan proposed by Urban Systems Ltd. The Urban Systems recommendations are in general compliance with the *Land Development Guidelines*.

We note that there are building lots proposed adjacent to the uppermost section of the unnamed tributary (upstream from 76 Avenue to the proposed 75A Avenue). Our assessment report indicated that this stream and its associated ravine and riparian zone should be protected. Discussions with both DFO and BCE indicated their support for this recommendation. As such, the plan should be revised accordingly.

In reference to correspondence to the City of Surrey from DFO and BCE dated February 10, 1995 and February 24, 1995, respectively, we confirm that these agencies comments/concerns have been addressed. More specifically:

- as only single-family residential development is proposed adjacent to watercourses, 15.0 metre fish and wildlife setbacks (plus 5.0 metre building setbacks) have been applied;

- the agencies have acknowledged that the trail systems adjacent to the watercourse currently exist. Under this circumstance, the trails may remain in their existing alignments;

- a raptor/heron nest survey was conducted but did not identify any nest sites;

- no detention facilities are proposed within setback areas (i.e. Fisheries Sensitive Zones). The proposed detention facility will be multi-purpose (incorporate water quality, wildlife, fisheries and aesthetic features);

- baseflows are maintained in the unnamed tributary downstream of 76th Avenue;

- the setback from Bear (Mahood) Creek will be based on the 100-year water line which will be determined by survey. DFO and BCE will be provided the opportunity to review and confirm that line in the field; and,

- sediment and erosion control will be implemented during construction to the satisfaction of DFO and BCE.

Please call me should you have any questions.

Yours truly,
ECL ENVIROWEST CONSULTANTS LIMITED

Original Signed By
IAN W. WHYTE

Ian W. Whyte
Senior Project Manager

IWW/

APPENDIX 3
Housing Guidelines

Detailed Model Housing Design Guidelines

Sample Architectural Design Guidelines

Detailed Model Housing Design Guidelines

Detailed Model Housing Design Guidelines

1.0 PURPOSE OF THE SINGLE FAMILY HOUSING DESIGN GUIDELINES

These Design Guidelines are intended to promote the creation of attractive neighbourhoods with well designed, high quality homes. The requirements in these Design Guidelines are supplementary to the Zoning By-law and do not supersede it. The design requirements must be used, together with all City by-laws and other relevant regulations.

The City of Surrey requires the Developer of the subdivision to retain a professional designer as the Design Consultant to control the requirements in these Design Guidelines. The Design Consultant is encouraged to expand on these requirements to develop an attractive neighbourhood. The Design Consultant should use a variety of house designs, allowing more than one design concept in a development. The City of Surrey shall reserve the right to question, to accept or to deny an individual as a qualified Design Consultant experienced in house design. The purpose of the foregoing is related to the exterior design only.

The words "owner," "property owner," "builder," or "purchaser" shall have the same meaning as the person having ownership of the property referenced in this document.

2.0 PROCEDURES AND REQUIREMENTS

The Design Consultant (hereinafter called the Consultant) is a third party Registered Architect or Home Designer with professional experience recognized by the City of Surrey in the home design field. The Consultant is to ensure that the home and landscape designs are in compliance with the requirements in these Design Guidelines.

All plans must be signed by the consultant, with his/her name clearly written in block letters adjacent the signature in the following format:

DESIGN CONSULTANT:

Address: _____

Phone No: _____

Signature: _____
& Initials

Date: _____

The City of Surrey relies on the Design Consultant to ensure that the Design Guidelines are followed. The City will evaluate the Design Consultant's qualifications to administer the Design Guidelines and to monitor the Consultant's performance under these provisions. The City will also require the Design Consultant's approval prior to accepting building drawings for building permit.

3.0 ENFORCEMENT OF THE DESIGN GUIDELINES

These Design Guidelines form part of the Design Guidelines registered under Section 216 of the Land Title Act.

Before selecting building plans, it is recommended that builders and/or property owners first read the requirements in these Design Guidelines.

Builders and/or lot owners must contact the Design Consultant retained by the developer with a preliminary sketch or design along with proposed colours and finishes, to ensure integration with the design requirements and nearby dwellings.

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 accepted in writing by the appointed Design Consultant who shall have the right and power to accept and reject same in accordance with the requirements in these Design Guidelines. The Developer's Design Consultant shall be protected from liability for enforcing the requirements in these Design Guidelines.

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

REQUIREMENTS FOR EXTERIOR HOME DESIGN APPROVAL:

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

- Two sets of house plans which include all four (4) elevations, and a site plan showing the house on the lot at a 1:250 (1/16" = 1' 0") scale.

- Samples of colours and materials of the exterior finishes.

The owner is to follow the recommendations of the Consultant. In all cases where major revisions or refusal of the home design is involved, the owner will be given an opportunity to meet and discuss the proposed revisions with the Consultant before a formal request for changes or an outright refusal of the home is issued. Only plans displaying the Consultant's acceptance stamp and signature will be accepted by the City of Surrey at time of the building permit application. The Consultant is to complete a housing design checklist to ensure compliance with these Design Guidelines, to be

submitted with building permit application drawings. Any subsequent changes must be approved by the Consultant.

The Consultant shall collect a compliance fee from either the builder or the owner and will be responsible for signing off the release of the compliance fee.

After the house and front yard landscaping are completed, it will be inspected by the Consultant to ensure that the requirements in these Design Guidelines have been adhered to. At the discretion of the Consultant, a portion of the compliance fee may be retained after final building approval has been issued by the City to ensure the proper installation and survival of landscape materials, at which time these will be checked by the Consultant. If found satisfactory, the compliance fee will be returned.

4.0 REQUIREMENTS FOR THE LOT

4.1 Lot Grading

House elevation drawings shall show final grades and elevations. The dwelling's design is to be compatible with the approved lot grading plan requirements and the minimum basement elevations thereon. The owner is responsible to finish the lot grading in accordance with the lot grading plan accepted by the City.

The owner is 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 interrupt the drainage pattern.

4.2 Retaining Walls

Retaining walls, where permitted, shall be treated and/or integrated with the landscaping to "soften" the visual effect of the retaining wall.

All retaining walls and their foundations, including drainage pipes, are to be within the property lines so as not to encroach on the neighbouring lot.

5.0 DESIGN REQUIREMENTS FOR THE HOUSE

General

The Consultant is required to create attractive neighbourhoods, possibly with a special character or style. The Consultant is to consider design parameters which reflect the surroundings. Front entrances to dwellings should be compatible with the design and scale of the dwelling.

To discourage the conversion of homes to include illegal suites, houses will not be permitted to have a second kitchen or food preparation area or plans which would facilitate or promote this conversion unless the property has been zoned to permit a secondary suite.

5.1 Proposed House/Subdivision Concept

_____

_____

_____

_____

5.2 The proposed housing types shall be limited to:

a) _____

b) _____

c) _____

d) _____

The distribution and number of housing types are on the subdivision map in Schedule 1 (attached).

5.3 Exterior Design

Exterior finishing materials shall consist of:

Front:

_____

_____

Rear:

_____

_____

Sides:

_____

_____

Exterior Finishes shall be in the following colours:

a. _____

b. _____

c. _____

d. _____

The style of bricks or stones is: _____ .

The colours of bricks or stones are: _____ .

The use of a concrete block as an exterior chimney material is not permitted. The finish of the exterior chimneys shall consist of: _____ .

_____

The colour of the finish on exterior chimneys shall be: _____ .

The style of windows shall be: _____

_____ .

The colour of exterior finish shall be: _____ .

Wood trim around windows (if applicable) shall be: _____ .

Wood trim around windows (if applicable) shall be: _____.
_____in colour.

5.4 Roofs

A consistent roof pitch is desired. Roof slopes shall be designed to reduce the apparent mass of both the downhill and uphill sides of the dwelling. Flat roofs will not be encouraged.

The roofing materials and colour shall be: _____ .

Roof chimneys, flashings, etc. are to be of the following materials and colour:

_____ .

Material and colour for rain water leaders shall be _____ .

Material and colour for soffits shall be _____ .

5.5 Driveways and Garage

General

Garage and driveway locations must be approved by the Consultant to ensure compatibility with adjacent houses. Some of the lots may have specific driveway and garage requirements due to servicing and the location of trees and street lights. Side entry, rear entry, or detached garages are encouraged. Where side entry garages are considered, the driveway entrance should be screened from the adjacent dwelling by appropriate landscaping.

All garages must be constructed in the same materials and style as the house.

The number of garage stalls/doors are limited to: _____.

All garages must have closing doors of _____ material and _____ colour(s).

The material for the driveway shall consist of _____.

6.0 REQUIREMENTS FOR TREE PRESERVATION AND LANDSCAPING

6.1 Tree Preservation

(Not Applicable), or

Special effort is to be made to retain existing trees with respect to the lands on any lot thereof, identified as "trees to be preserved" on the Tree Location Plan, a copy of which plan forms part of and is attached to these Design Guidelines as Schedule II. The Developer is to provide the purchaser of each lot containing such trees with a copy of the Tree Location Plan, as this may impact the location of the dwelling within the allowable building envelope.

Building location and construction and tree preservation requirements shall be in compliance with the Surrey Tree Preservation By-law.

A. 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, stating 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.

It will be at the discretion of the City to either grant or deny any such permit.

It shall be the sole responsibility of the lot purchaser/owner to employ the appropriate professional person to assess the tree.

B. The preserved trees on the lands shall be maintained in accordance with reasonable arborist practice.

6.2 Landscaping

To enhance the settled appearance in the neighbourhood, the Consultant requires the owner to complete front yard landscaping within six (6) months once the house is occupied. 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 during the year. The required landscaping must be completed prior to final inspection by the Consultant.

All streets fronting yard areas, including side yards, must be landscaped with trees, lawns, shrubs or flower beds or other landscaping materials. Lawn only is not adequate.

The minimum amount of plant material for the front and side yards is as follows:

Lot Frontage	Large Trees **15 m or more	Medium Trees **(5-14 m)	Small/Fastigiate Trees **(4 m or less)
12 m (40'0")	0	1	1
15 m (50'0")	0	1	2
18 m (60'0")	1	1	3
or	0	2	3
30 m (100'0")	1	2	3
or	0	2	3

* Lot frontage as defined in the Zoning By-law
** Height at Maturity

Corner lots will require twice the amount of plant materials listed above for both the front yard and side yard along a flanking street.

i. Not less than forty percent of the front yard should be covered with soft (green) landscaping; ten percent of which the front yard area should be covered with ground cover(s) other than turf, such as low shrubs, perennials and/or annuals.

ii. Deciduous trees must have a minimum trunk calliper of 5.0 cm (2"); coniferous trees must have a minimum height of 3 m (10'). 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.

iii. Existing trees left standing in the front yard may be counted as part of the minimum required trees. Boulevard trees may be included as part of the required number of trees; however, any tree planted on City property must be listed on the City's "list of acceptable boulevard trees" and receive approval by the City's Parks & Recreation Department.

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. All trees planted on boulevards shall meet the 1994 "Boulevard Tree Planting Standards" as outlined by the Surrey Parks Operation Division, with a minimum of one tree in front of every residential lot. Irregular shaped lots, for example, on cul-de-sacs, may be landscaped at the discretion of the Consultant to avoid potential conflicts between the location of trees, driveways and utilities.

6.3 Fencing

No fencing shall be erected in the front yard setback area unless in compliance with the Surrey Zoning By-law and approved by the Consultant. In the case of corner lots, the front yard includes the flanking street yard. Ornamental screen shrubbery - either broad leaf evergreens or coniferous - is the recommended alternative to fencing. Wood fencing must be stained or painted on both sides. Landscaping on the exterior face of fences facing public streets or parks is strongly recommended.

END OF DOCUMENT

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Sample Architectural Design Guidelines

SAMPLE ARCHITECTURAL DESIGN GUIDELINES

This is SCHEDULE "A" to the Sales Agreement dated the

10th day of July, 1989.

covering Lot(s) _____

BETWEEN:
AND:

BOUNDARY PARK PHASE 9

DESIGN GUIDELINES

The objective in providing architectural guidelines in the Boundary Park Subdivision is to achieve a well-coordinated, attractive development which involves a number of individual builders, each with his own product. These guidelines have been prepared in order to provide builders in Boundary Park Phase 9 with sufficient information to prepare acceptable submissions. Adherence to the Guidelines will not only protect the developer's project, but will also benefit the builder and subsequent owners through improved marketability.

1. BUILDING PLAN APPLICATION/APPROVAL PROCEDURE

Prior to applying for a Building Permit from the Corporation of Surrey, builders are required to have their building plans approved by the Vendor's designated architect.

A. Preliminary Design Approval:

In order to ensure the appropriateness of contemplated dwelling selections, the Purchaser of each lot, or his agent, shall submit to the Architect for his preliminary design approval, two (2) copies of a sketch, photograph or plan of the proposed dwelling with colours and finishes thereon, the maximum size of which shall be 8½" X 11".

B. Final Design Approval:

Upon receipt of preliminary design approval from the Architect, the Purchaser shall submit to the Architect one (1) copy of each of the following documents:

(1) house plans and sections at 1:50 scale;

(2) site plan at 1:100 scale;

(3) comprehensive site plan at 1:200 scale for 2 or more adjacent Lots where those Lots are registered in the name of or controlled by the same individual or individuals, company or companies or any combination of the above;

(4) details of proposed exterior house and roof finishes and colours;

(5) details of proposed landscape treatment, including the representation of existing vegetation to be either retained or removed and the representation of fencing;

(6) details of proposed driveway location and finish;

(7) proposed elevation of the garage slab, lowest habitable floor, lot corners, finished grades at all building corners, and lot grading pattern as referenced from the centre point of the curb cut whose designated elevation shall be 0.0 m.

2. Incomplete applications for either preliminary design approval or final design approval shall be returned to the Purchaser or his agent and marked as "incomplete".

3. After having obtained final design approval of any plans by the Architect, any deviation or change from such approved plans must receive the prior approval of the Architect.

4. Lot Grading

Lot grading shall, so far as reasonably possible, maintain the natural grade and shall be consistent with the subdivision's comprehensive grading plan filed with the District by the Vendor. No fill is to be deposited on site unless it can be used without detrimental effect to final grading.

Should retaining walls be required, they shall not exceed 1.0 metres in height above natural grade except with prior approval of the Architect. Retaining walls shall be constructed of natural stone or reinforced concrete finished in natural stone or other architectural finishes approved by the Architect. Retaining walls shall reflect dwelling and street design considerations.

5. Building Design

A. Dwelling Size

The following are minimum standards which the Vendor feels are essential to maintain the overall quality of the development.

(1) Conventional Basement Homes
Site coverage of at least 1,300 sq. ft.
Finished living area at least 1,300 sq. ft. on main floor.

(2) Two-storey Homes (living down, bedrooms up).
Site coverage of at least 1,300 sq. ft. (including garage).
Main floor living area at least 900 sq. ft. finished.
Upper bedroom area at least 600 sq.ft. finished.

(3) Split Level Homes
Site coverage of at least 1,400 sq.ft. including garage.
Finished living area of at least 1,450 sq.ft.

(4) Ranchers (no basement)
Finished living area of at least 1,500 sq.ft. excluding garage.
Special design considerations will apply.

These standards may be reduced in exceptional circumstances, if the Purchaser compensated with other amenities to maintain the market value, and the house meets the design and quality objectives for the subdivision.

Streetscapes

Streetscapes should be designed to ensure gradual transition from one type of building to another. Identical building designs shall be separated by not less than three lots and shall not be built directly opposite each other on a common street.

Abrupt changes in the height of eaves and fascias from building to building should be avoided. One level, flat roofs will not be permitted.

Corner Lots

All corner Lots shall be given special attention due to their significance in establishing street and/or neighbourhood character and quality. No corner Lot house design shall be approved which does not, in the opinion of the Architect, present a pleasing aspect to both streets.

6. Driveways

All driveways shall be concrete with slopes not exceeding 1:10.

7. Garages

Garages shall be incorporated within the overall massing of the building envelope and shall be constructed with garage doors. No carports or garages without doors shall be constructed. Garages separate from houses shall not be constructed without the express permission of the Vendor or its designated Architect.

8. Landscaping

No trees shall be cleared from any lot except:

(a) those situated within the proposed building envelope;
(b) those that are dead or which constitute a safety hazard; or
(c) those approved by the Architect.

Within three months of the substantial completion of any building, the following landscaping works shall be carried out by the Purchaser:

(a) lawn seed or turf installed from side lot line to side lot line and from front curb to house;

(b) selective use of bark mulch, shrubs and trees to create an attractive front yard; and

(c) side and rear yards cleared of underbrush, small growth, dead or leaning trees and graded.

9. Exposed Foundation and/or Concrete Walls

Any exposed concrete measuring 300 mm above finished grade shall be finished with the same material(s) as the adjoining wall finishing.

10. Signs

One (1) temporary real estate sign may be placed on each Lot. No sign shall exceed two (2) feet by three (3) feet in size except with the approval of the Architect.

11. Exterior finishes

(a) Walls - All exterior walls on a building shall be finished in the same materials and shall demonstrate continuity over all building sides. Design solutions providing one material to building fronts with separate finishing for the balance shall not be employed. Stucco finishing must be accompanied by trim materials. Exposed or painted concrete block shall not be employed. Changes in material on wall faces shall only occur at the inside corner of walls, not on outside corners or on planar wall faces. Siding oriented other than horizontally or vertically must have the express approval of the Architect.

Continuous brick facing is required on fronts and partial sides of dwellings to create a building base; however, 2 x 10 skirting in lieu of brick facing will be considered, depending upon suitability of house design. The location and extent of such skirting will be finalized at the time of plan approval.

(b) Trim - Trim boards in complementing colours are required around all windows and doors. Exceptions require approval of the Architect.

For plan approval purposes, all door and window trim must be wood, fascia boards behind gutters are preferred to fascia gutters, and horizontal wall mid-boards are required to assist in high blank wall conditions.

12. Roofs

Cedar shakes or cedar shingles shall be the recommended roofing material; all other roofing materials require the approval of the Architect. Roof slopes which do not equal or exceed 5:12 must have the express approval of the Architect.

13. All chimneys shall originate at grade and be finished in brick. Selection of brick colour and size to be consistent with other finishing materials. In the event of a rear chimney not viewed from the streetscape, such may be finished to match house siding, but only as a design guideline relaxation as approved by the design panel.

14. Colours

Natural colours shall be used. All colour schemes for guidelines shall be approved by the Architect. Stucco finishing shall be painted in a colour approved by the Architect. House numbers shall be of a contrasting colour to the background for rapid identification by emergency vehicles.

15. Security Deposit

A deposit of $1,000 per lot shall be paid to the Vendor to guarantee compliance with the foregoing Guidelines.

Providing all requirements of the Guidelines have been met, which shall be solely in the discretion of the Vendor, this deposit shall be returned to the Purchaser after completion of construction; otherwise the said $1,000 may be retained by the Vendor as liquidated damages and not as a penalty.

It must be emphasized that this deposit will not be returned in the event of a re-sale of the property where construction is not complete.

****

I hereby acknowledge receipt of the Design Guidelines for Boundary Park Phase 9 and agree to abide by them. If I fail to do so, Genstar may enter onto the land and correct any deficiencies and recover the cost thereof from me.

SIGNED _____

DATE _____

DESIGN CONSULTANT: DEVELOPER:

APPENDIX 4

Drainage Report

BC Hydro Letter of Acceptance

Memorandum of Understanding regarding the Pond in the Guildford Golf Course

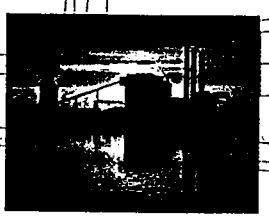
Drainage Report

PRECAST CONCRETE AND FIBREGLASS SYSTEMS

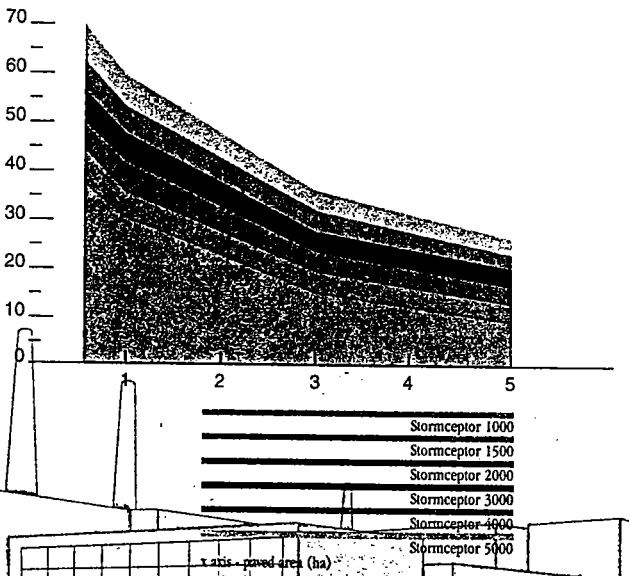
In order to meet a wider range of needs, Stormceptor™ is available in a choice of materials.

FIBREGLASS

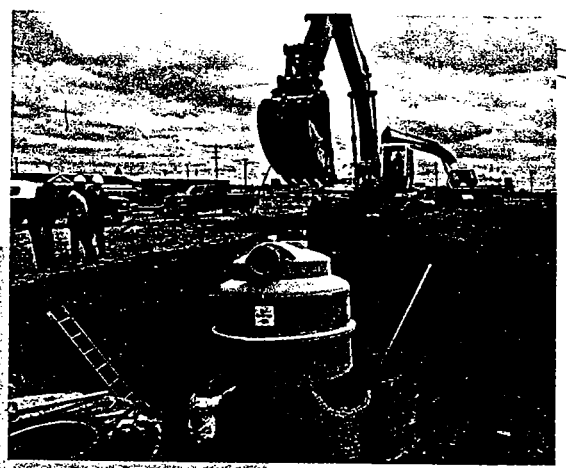
The fibreglass Stormceptor™ is designed for emplacements where there is a potential for oil and chemical spills, and where they accumulate in substantial volume between clean ups. Being chemically inert, light weight and easy to install, the fibreglass Stormceptor™ is particularly suitable for industrial properties, fuel tank farms, automotive service stations and restaurant parking lots.

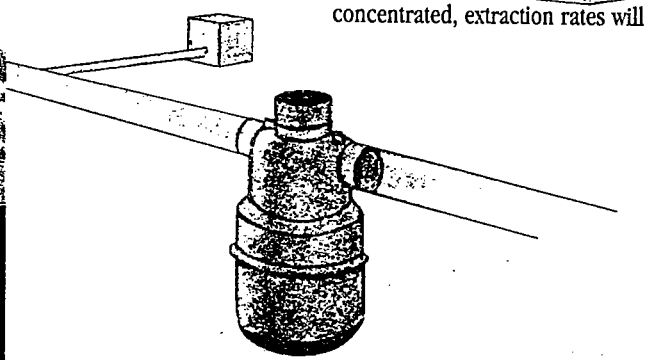


LONG TERM SEDIMENT REMOVAL VS. DRAINAGE AREAS



Above: The rates at which Stormceptor™ removes Suspended Solids, based on EPA sediment distribution data for end-of-watershed installations. When Stormceptor™ is used at source connections, where sediment is more concentrated, extraction rates will be noticeably higher.



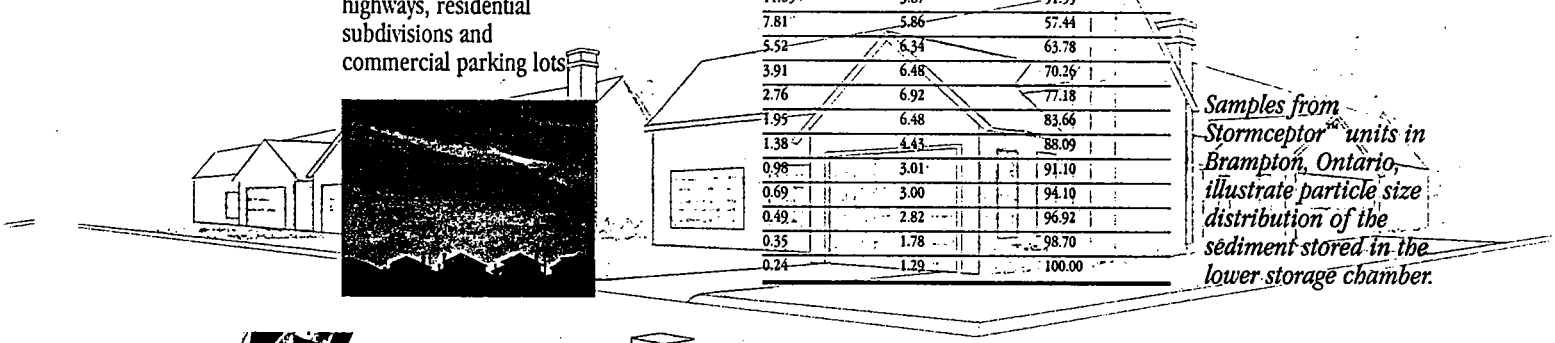


BASIC SIZING GUIDELINES
fibreglass STA/precast concrete STC

PAVED DRAINAGE AREA ha (acres)	PIPE SIZE (ID) mm(in.)	SITE CATEGORY				
		LIGHT/HEAVY INDUSTRIAL	AUTOMOTIVE SERVICE STATION	COMM./RES. PARKING LOT	LOW/HIGH DENSITY SUBDIVISION	PUBLIC STREET ALLOWANCE
UP TO 1 ha (UP TO 2.5 acres)	≤254 (10)	STA 750	STA 750	STC 750	STC 750	STC 750
	≤457 (18)	STA 1000	STA 1000	STC 1000	STC 1000	STC 1000
	≤610 (24)	STA 1500	STA 1500	STC 1500	STC 1500	STC 1500
	≤762 (30)	STA 2000	STA 2000	STC 2000	STC 2000	STC 2000
	>762 (30)	STA 3000	STA 3000	STC 3000	STC 3000	STC 3000
1 ha TO 2 ha (2.5 acres TO 5 acres)	≤457 (18)	STA 1500	STA 1500	STC 1500	STC 1500	STC 1500
	≤610 (24)	STA 2000	STA 2000	STC 2000	STC 2000	STC 2000
	≤762 (30)	STA 3000	STA 3000	STC 3000	STC 3000	STC 3000
	>762 (30)	STA 4000	STA 4000	STC 4000	STC 4000	STC 4000
2 ha TO 3 ha (5 acres TO 7.4 acres)	≤457 (18)	STA 2000	STA 2000	STC 2000	STC 2000	STC 2000
	≤610 (24)	STA 3000	STA 3000	STC 3000	STC 3000	STC 3000
	≤762 (30)	STA 4000	STA 4000	STC 4000	STC 4000	STC 4000
	>762 (30)	STA 5000	STA 5000	STC 5000	STC 5000	STC 5000

PRECAST CONCRETE

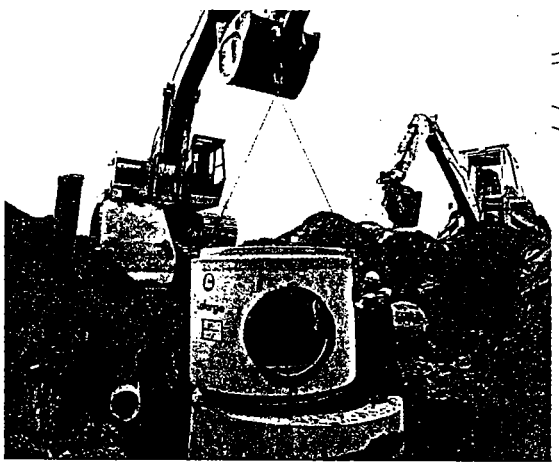
The precast concrete Stormceptor™ is manufactured from easily assembled concrete components that are pre-engineered for traffic loading. The precast concrete Stormceptor™ can be installed in road allowances similar to standard manhole structures. These installations typically include roads and highways, residential subdivisions and commercial parking lots.

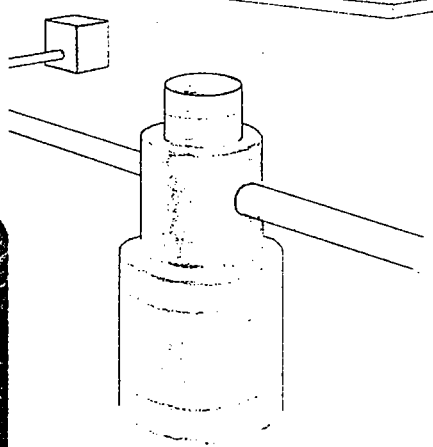


PARTICLE-SIZE DISTRIBUTION IN SEDIMENT TRAPPED BY STORMCEPTOR™

PARTICLE SIZE (microns)	CLASS FREQUENCY (%)	CUMULATIVE COARSER (%)
DEBRIS	9.81	9.81
1414.21	2.87	12.68
1000.00	2.57	15.25
707.11	2.50	17.75
500.00	1.86	19.61
353.55	2.80	22.41
250.00	2.85	25.26
176.78	4.00	29.26
125.00	4.21	33.48
88.39	3.46	36.94
62.50	2.77	39.71
44.19	1.27	40.98
31.25	1.84	42.82
22.10	2.14	44.95
15.63	2.76	47.71
11.05	3.87	51.59
7.81	5.86	57.44
5.52	6.34	63.78
3.91	6.48	70.26
2.76	6.92	77.18
1.95	6.48	83.66
1.38	4.43	88.09
0.98	3.01	91.10
0.69	3.00	94.10
0.49	2.82	96.92
0.35	1.78	98.70
0.24	1.29	100.00

Samples from Stormceptor™ units in Brampton, Ontario, illustrate particle size distribution of the sediment stored in the lower storage chamber.





FLOWS & CAPACITIES
fibreglass STA/precast concrete STC

MODEL	MAXIMUM TREATED FLOWRATE l/s (Imp gal/min)	MAXIMUM BY-PASS FLOW RATE l/s (Imp gal/min)	TOTAL HOLDING CAPACITY litres (Imp gal)	OIL HOLDING CAPACITY litres (Imp gal)	SEDIMENT HOLDING CAPACITY litres (Imp gal)
STA/STC 750	18.0 (238)	90.7 (1197)	3410 (750)	1023 (225)	1932 (425)
STA/STC 1000	18.0 (238)	457.6 (6040)	4546 (1000)	1023 (225)	3069 (675)
STA/STC 1500	18.0 (238)	983.3 (12978)	6819 (1500)	1023 (225)	5342 (1175)
STA/STC 2000	30.1 (397)	1781.0 (23506)	9092 (2000)	1905 (419)	6474 (1424)
STA/STC 3000	50.0 (660)	4371.9 (57702)	13638 (3000)	2978 (655)	9547 (2100)
STA/STC 4000	50.0 (660)	4371.9 (57702)	18184 (4000)	2978 (655)	14093 (3100)
STA/STC 5000	50.0 (660)	4371.9 (57702)	22730 (5000)	2978 (655)	18002 (3960)

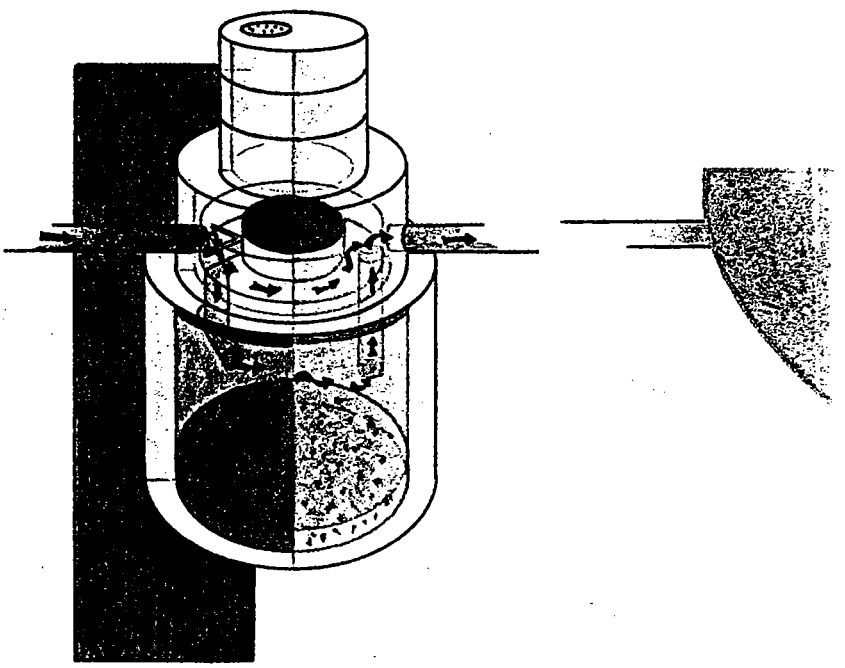
DESIGN AND OPERATION

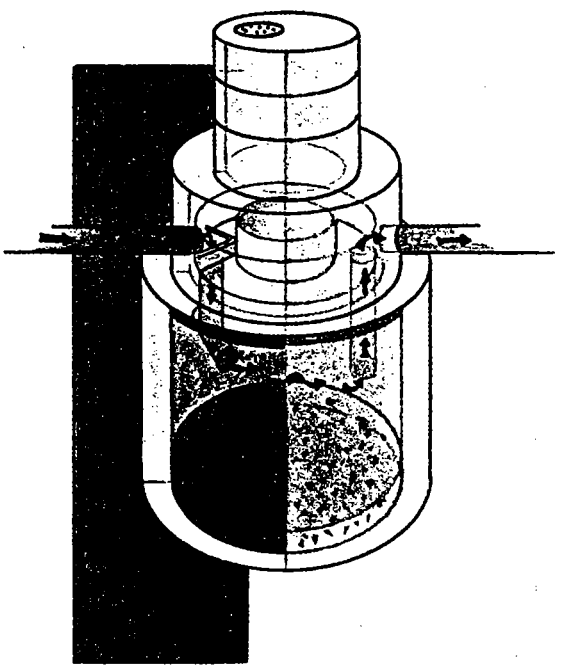
The utility-patented Stormceptor™ consists of three sections: a "separation/storage" chamber at the bottom, a "bypass" chamber above, and a central maintenance shaft that rises through both to street level.

Under normal, or "design flow" operating conditions, stormwater flows into the upper bypass chamber, is diverted by a v-shaped weir down a pipe, and into the "separation/holding" chamber. This downward flow is directed, by right-angled outlets, around the circular walls of the chamber, and flows horizontally to the outlet pipe. Above and below this throughflow, oil and sediment accumulate in relative quiescence. Up to 80% of the inflowing fines and coarse sediment load settles down to the floor of the chamber, while the petroleum products and volatile vapours rise into the airtight region above. Outflow contains no detectable levels of free Oil and Grease.

DOES NOT SCOUR

During high flow periods –which represent approximately 3% of all events –storm water surges flood over the diverting weir and continue through the bypass chamber into the downstream sewer. This rapid activity creates pressure equalization across the bypass chamber, thus decreasing flow through the separation chamber which will prevent scouring. A proportion of incoming sediment continues to hit the weir and collect in the lower chamber where it remains, with any residual petroleum products, for scheduled removal.





Stormceptor

SERVICING

As operating conditions are specific to each type of location, servicing schedules for Stormceptor™ are best determined by experience. A study of average accumulation rates is available from Stormceptor Canada Inc.

Some general guidelines to servicing are as follows:

Inspect the Stormceptor™ on a monthly basis and note sediment and oil accumulations. More frequent inspections are appropriate where oil spills occur regularly. Stormceptor Canada Inc. can provide advice on sampling equipment.

Sediment should be removed annually, or whenever the accumulation reaches 50% of the operating depth, from base to drain invert. In areas of new construction, or where vegetation has not been established, more frequent removal may be necessary.

Vacuum trucks are used to remove the sediment and oil from the Stormceptor™ treatment chamber. Oil levels greater than 2.5 cm should be removed immediately by a licensed waste management firm, and significant spills must be reported to the appropriate regulatory agency. Stormceptor Canada Inc. can provide advice on suppliers of these services in your area.

Owner of Patents and Trademarks; Fibreglass Stormceptor™ manufactured by:

Stormceptor Canada Inc.
195 The West Mall, Suite 405
Etobicoke, Ontario
M9C 5K1

Ph. 416-626-0840
Tf. 800-565-4801
Fx. 416-626-8710

Precast Concrete Stormceptor™ manufactured under license by:

ONTARIO

Lafarge Construction Materials
A Division of Lafarge Canada Inc.
Pipe and Precast Division
1555 Matheson Boulevard East
Mississauga, Ontario
L4W 1H9

Ph. 905-625-5900
Fx. 905-625-0136

ALBERTA & BRITISH COLUMBIA

Lafarge Construction Materials
A Division of Lafarge Canada Inc.
Northern Alberta Division
Drainage Systems
4425-92 Avenue
Box 5990 Station "L"
Edmonton, Alberta
T6C 4G5

Ph. 403-468-5910
Fx. 403-465-6443

Lafarge Construction Materials
A Division of Lafarge Canada Inc.
Southern Alberta Division
Pipe & Standard Products Operation
6920-13 Street South East
Deerfoot Trail & Glenmore Trail South East
Box 1180 Station "T"
Calgary, Alberta
T2H 2H5

Ph. 403-292-9501
Fx. 403-255-2677

MANITOBA & SASKATCHEWAN

Lafarge Construction Materials
A Division of Lafarge Canada Inc.
Manitoba Division
Drainage Products
185 Dawson Rd.
Winnipeg, Manitoba
R2J 0S6

Ph. 204-958-6345
Fx. 204-233-5644

DISTRIBUTED BY:

Lafarge Construction Materials
DIVISION OF LAFARGE CANADA INC.
• PRECAST CONCRETE SYSTEMS • DRAINAGE SYSTEMS

BC Hydro Letter of Acceptance

BC hydro

proud of our Service

Corporate Services Division

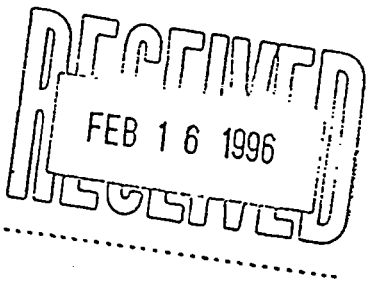
12 February 1996

Assignment: 740
File: 1783A BCE, 1102 BCE
1783 BCE

Circuit/Str.: 2L75/5L41/81
Twrs. #4/1, 572/4, 160/4
Your File: 6133409.1 C5

VIA FAX 273-8752

Martin Moseley, P. Eng.
Urban Systems
Engineers, Planners, Landscape Architects
#204 - 10711 Cambie Road
Richmond, B.C.
V6X 3G5



Dear Mr. Moseley:

Proposed Storm Detention Pond ("the storm detention pond") in B.C. Hydro Rights of Way 214218C and 214219C, RW Plan 12618 and 183910C RW Plan 12700 (the "right of way") located at the Guildford Golf & Country Ltd. at 76 Avenue and 148 Street, Surrey

We have reviewed your request and consent to the storm detention pond as shown on Drawing No. 740, copy attached within the right of way in accordance with the requirements attached.

While encouraging compatible uses of its rights of way, B.C. Hydro also wishes to emphasize the necessity of following safe work practices in the vicinity of high voltage electrical lines and related equipment. In addition to outlining safe work practices in the right of way, the attached form outlines requirements Guildford Golf & Country Ltd. must comply with for long term safety, maintenance and security of Hydro's electrical system. Please ensure that others involved in the construction or operation of the storm detention pond adhere to all the requirements.

Please have Guildford Golf & Country Ltd. review the attached form carefully and acknowledge that they understand and accept all requirements by signing the duplicate in the space provided and returning it to this office by 15 March 1996. The original may be kept for their your records and information.

This consent will be validated upon B.C. Hydro's receiving the signed duplicate form.

For clarification or further information, please call Barbara Elton at 623-3808, FAX 623-3951.

Yours truly,

Mary-Lou Costantino
Property Assistant Workleader
Right of Way Management

Memorandum of Understanding Regarding the Pond in the Guilford Golf Course

DATE:	12 February 1996
ASSIGNMENT NO.:	740
BCH FILE NO.:	1783A BCE, 1102 BCE and 1783 BCE
APPLICANT:	Guildford Golf & Country Ltd. (**"Guildford Golf & Country Ltd."**)
PROPOSAL:	Storm Detention Pond (**"the storm detention pond"**)
DRAWING:	#740
RIGHT OF WAY:	214218C and 214219C, RW Plan 12618 and 183910C, RW Plan 12700 (**"the right of way"**)
LAND:	Lot 1, Section 22, Township 2, New Westminster District Plan LMP3108 (**"the land"**)
LOCATION:	Between 76th Avenue and 148th Street, Surrey (**"the location"**)
CIRCUIT NO.:	2L75/5L41/81 Twrs. #4/1, 572/4, 160/4

SPECIAL CONDITIONS:

1. The crest of the berms must not come within 10 m of any B.C. Hydro plant (poles or towers).

2. The slope of the storm detention pond edges must not be less than 4 to 1 as shown on Urban Systems X-Section 1 and X-Section 2.

3. Under Circuit 5L81, the West berm must not exceed the 2 m height shown on the drawings.

4. Under Circuit 5L40, the East berm must not exceed the 3.5 m height shown on the drawings.

6. Due to minimal conductor to ground clearance in the area the height of equipment used to construct the berm will be restricted. This will be discussed at the on-site meeting.

APPROVAL REQUIREMENTS:

A. GENERAL

1. At least 3 working days prior to commencing activity in the right of way, contact Larry Ratzlaff, Field Production Manager, at 590-7641 to arrange an on site meeting.

   The on site meeting is necessary because activity will take place near high voltage electrical lines and related equipment. Safe working procedures will be outlined and if regulations require, a Workers Compensation Board ("WCB") form 30M33 (governing equipment activity) will be completed.

2. This consent applies to B.C. Hydro's rights only. Guildford Golf & Country Ltd. shall also obtain consent from all other parties with an interest in the affected land and shall comply with any applicable laws and regulations.

3. These requirements are to be read together with B.C. Hydro's Statutory Right of Way Agreement registered on the land and are not intended to diminish the terms of the Agreement.

4. B.C. Hydro shall not be held responsible for any damage to the storm detention pond or for anything that would interfere with or hinder the operation or use of the storm detention pond arising out of B.C. Hydro business activities within the right of way, unless B.C. Hydro has been negligent in the conduct of such activities. Any risks, damages, losses and injuries to property or persons, including B.C. Hydro's works or employees, agents or contractors, that arise from the construction, operation, maintenance, repair or removal of the storm detention pond are the responsibility of Guildford Golf & Country Ltd.

5. B.C. Hydro reserves the right to terminate its consent relating to the storm detention pond if Guildford Golf & Country Ltd.:

   (a) fails to ensure compliance with all the requirements herein, or
   (b) fails to advise all others involved in the construction, use or operation of the storm detention pond of the requirements herein.

B. PERSONAL SAFETY

6. Guildford Golf & Country Ltd. understands and acknowledges that the construction, use and operation of the stoom detention pond will be near 230,000 and 500,000 volt electrical lines. Guildford Golf & Country Ltd. will ensure compliance with all applicable WCB rules and regulations, including Section 24 of the Industrial Health and Safety Regulations.

   Persons and equipment must not come within 4.6 and 6.0 metres respectively, of the electrical transmission line conductor wire.

7. The maximum height of vehicles permitted on the right of way, including load and reach, is 4.1 metres.

8. Minor levels of electrical induction may be experienced due to the proximity of electrical lines.

9. Examples of uses not permitted in the right of way include:

   (a) buildings or portions of buildings, including foundations and eaves.
   (b) storage or handling of flammable or explosive material;
   (c) fuelling of vehicles and equipment;
   (d) burning;
   (e) log decking;
   (f) blasting;
   (g) stock piling of excavated, building or other material.

C. PLANT SECURITY AND MAINTENANCE

10. Access to the right of way for B.C. Hydro personnel must be maintained at all times. Interruption of the construction, use or operation of the storm detention pond may be necessary for electrical line maintenance or construction.

11. Changes in ground level elevations of more than 0.5 metres from original grade, other than those approved in this application, are not permitted without the prior written consent of B.C. Hydro.

12. Deterioration of drainage patterns or soil stability within the right of way must not occur as a result of the construction, use or operation of the storm detention pond.

13. Upon completion of the storm detention pond, the right of way must be restored as closely as is practically possible to the original condition or better at Guildford Golf & Country Ltd.'s expense.

14. Uses or installations other than the storm detention pond require additional written consent from B.C. Hydro.

15. Landscaping within the right of way is restricted to low-growing trees, shrubs and plants not exceeding 3.0 metres in height at maturity.

D. ADDITIONAL INFORMATION

16. BC Gas Utility Ltd. has a gas right of way on the property. Please make application to Gerry Sarich, Right of Way Administrator, BC Gas Utility Ltd., 16705 Fraser Highway, Surrey, B.C., V3S 2X7 (576-7084) for the consent.

17. Should design alterations, protection or relocation of existing B.C. Hydro's works be required as a result of the storm detention pond, Guildford Golf & Country Ltd. will be responsible for all costs.

18. The storm detention pond must not be placed or constructed within 10 metres of any B.C. Hydro tower base.

19. Urban Systems shall supply this office with two sets of "as-built" drawings showing the location of the storm detention pond in relation to B.C. Hydro's works and the right of way boundaries within 30 days of project completion.

20. If and when new B.C. Hydro works are to be built in the right of way, Guildford Golf & Country shall, at its expense, relocate the storm detention pond to an alternate location approved by B.C. Hydro or remove the storm detention pond upon B.C. Hydro giving not less than 90 days' written notice.

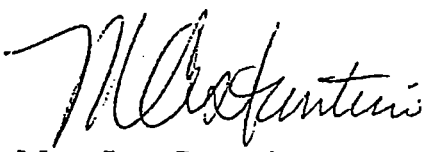
21. The storm detention pond within the right of way may not be enlarged, moved, or added to without the prior written consent of B.C. Hydro.

Detention Ponds:

22. B.C. Hydro reserves the right to fill in all or a portion of the detention pond to accommodate future electrical line construction. B.C. Hydro will give written notice no less than 90 days prior to filling the detention pond. If it is necessary to partially fill in the pond, B.C. Hydro will grant permission to extend the detention pond providing conditions permit, by a similar sized area on the right of way, at Guildford Golf & Country Ltd.'s expense.

23. B.C. Hydro will not be held liable for any loss of capacity (volume) of the detention pond as a result of filling in the pond to accommodate pole location or relocation.

Yours truly,



Mary-Lou Costantino
Property Assistant Workleader
Right of Way Management

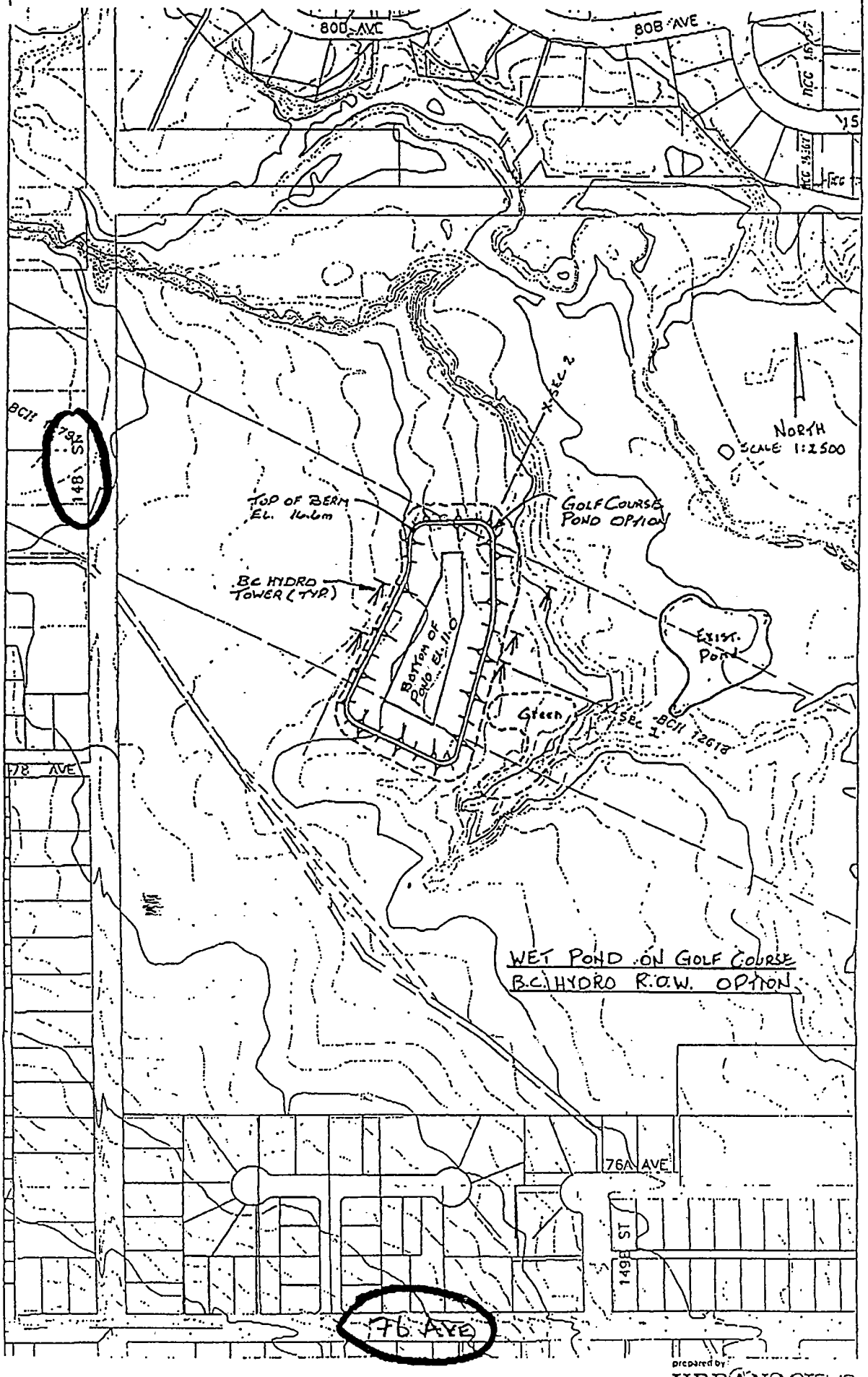
GUILDFORD GOLF & COUNTRY LTD.
accept and agree to the
requirements set out above.

_____
Signature

_____
(Please print Name/Title)

_____
Date

DRAWING NO. ASSIGNMENT #740



WET POND ON GOLF COURSE PROPERTY
OPTION

DRAWING NO. ASSIGNMENT
#740

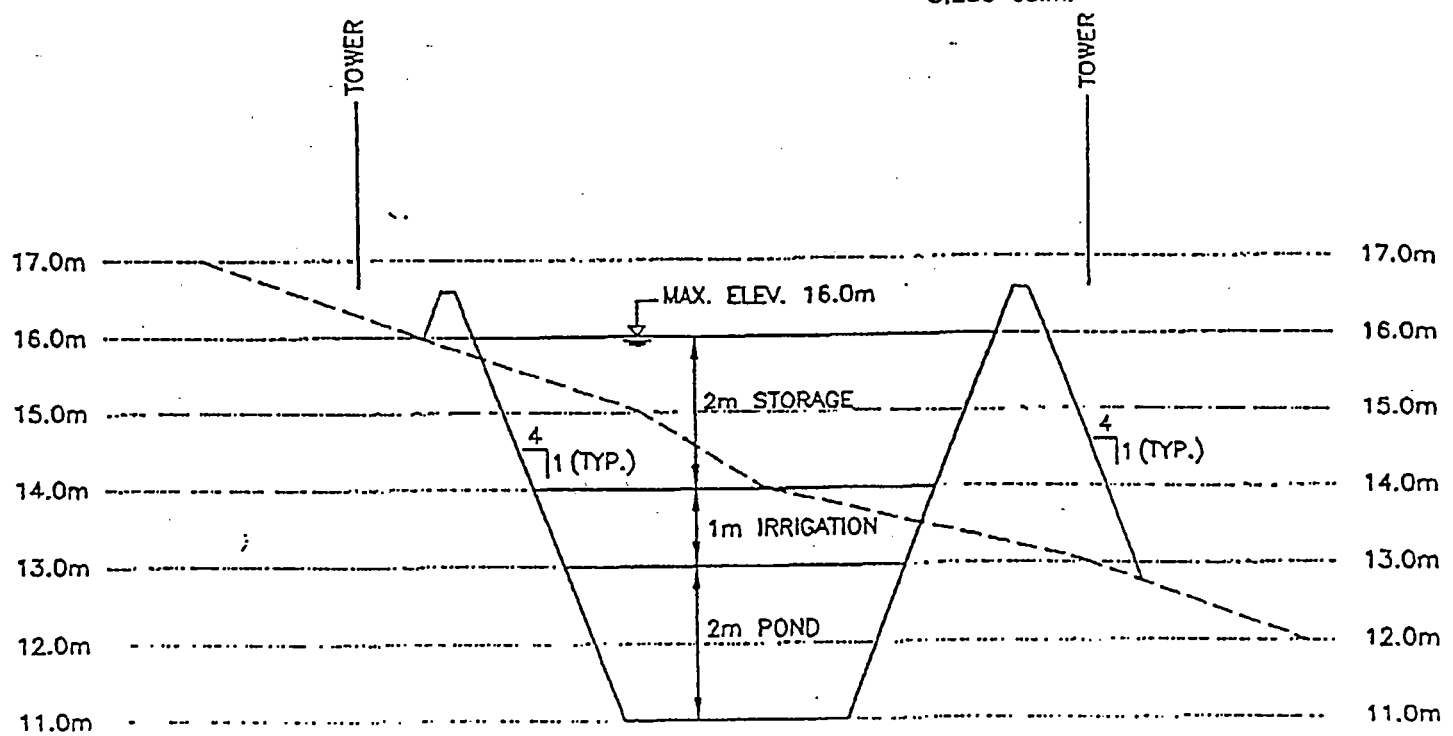
- REQUIRED VOLUME FOR STORAGE = 17,480 cu.m.
- MAXIMUM ELEVATION FOR STORAGE = 16.0m

CALCULATIONS

SIZE: BASE 125m x 25m (AVERAGE) = 3125 sq.m.
STORAGE AT EL. 15.0m
157m x 57m (AVERAGE) = 8949 sq.m.

VOLUME: 8949 sq.m. x 2m Depth = 17,898 cu.m.

STRIPPING: APPROX. 175m x 100m = 17,500 sq.m.
ASSUME STRIPPING DEPTH x 0.3 m
5,250 cu.m.



X-SECTION 1

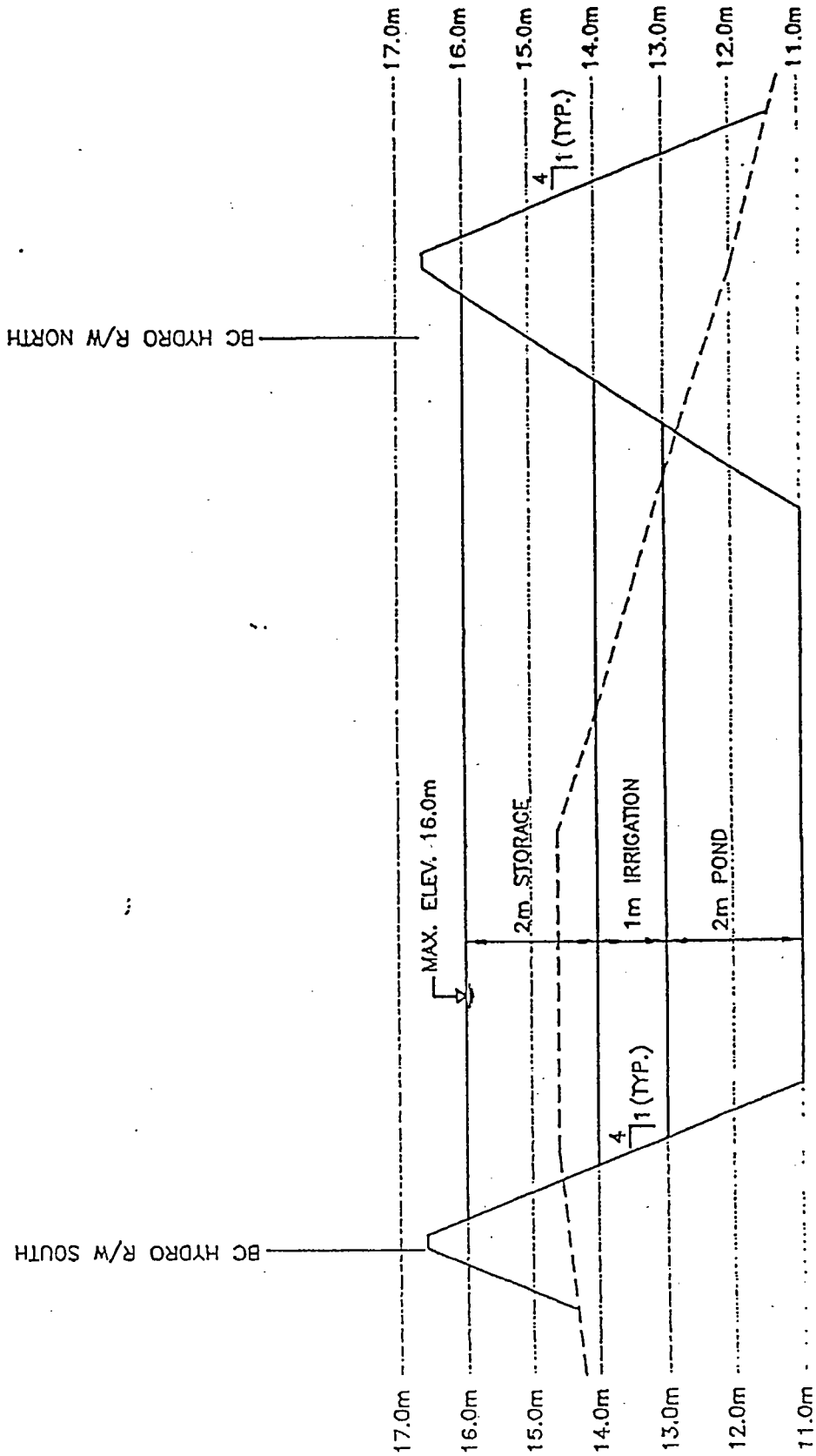
URBAN SYSTEMS

DATE DWN	NO.	DATE	REVISIONS	BY	APP'D
DEC., 1995					

GOLF COURSE POND TYPICAL SECTION

DWN: / CHK:	SCALE	DWG NO.
	1:1	1

DRAWING NO. ASSIGNMENT
#740



X-SECTION 2

URBAN SYSTEMS

NO.	DATE	REVISIONS	BY	APP'D

DATE DWN: DEC.,1995

GOLF COURSE POND · TYPICAL SECTION

DWN:	SCALE	DWG NO.
CHK:	1:1	2

GENSTAR

Genstar Development Company
Pacific Region
Suite 104, 4585 Canada Way
Burnaby, BC V5G 4L6
Telephone: (604) 299-4325
Fax: (604) 294-5214

February 27, 1996

Guildford Golf & Country Club
7929 - 152nd Street
Surrey, B.C.
V3S 3M5

Attention: Mr. Raoul Anderson

Dear Sir:

Re: Storm water Detention/Ornamental Pond - Guildford Golf Course

When we last met on January 19th, it was agreed that we were generally satisfied with the notion of a pond under the Power line across the Golf Course but that there was a whole host of related topics that had to be explored. We set a subsequent meeting but that was cancelled to allow you and Mr. Glen Shkurhan to examine the existing drainage works in the Golf Course and particularly, the possibility of diverting water from the proposed pond to the existing pond to the east.

Since that meeting, our Engineers have been working with Hydro who have now given their agreement in principle to the proposal. You will note in the first paragraph of the attached letter from Hydro to Urban Systems dated February 12, 1996 that they consent to the proposal with certain provisos. I have asked our Consultants to review the restrictions that Hydro seeks to impose in terms of slopes, heights of berms etc. and it does not appear that these requirements preclude construction of the type of pond we have been discussing.

Our Engineers have also been in discussion with Surrey Engineering Department officials and apart from the Hydro Company requirements that are set out in their letter, the following guidelines would cover the proposed pond from an Engineering point of view.

GENSTAR

DRAFT OUTLINE OF GOLF COURSE POND PROPOSAL

1.0 Right-of-Way:

1.1 Rights-of-way will be required in favour of the City of Surrey over the pond and the incoming and outgoing pipe works so that the City will have right of access to all Works at any time for maintenance of Works. An access easement will be required for access by the City to the pond if the access route cannot follow the routing of the sewer.

1.2 The routing of the piping to and from the pond will be established in consultation with the Golf Course and the City of Surrey.

2.0 Pond Design Criteria:

2.1 It is not practical to divert the proposed pond into the existing pond as discussed. The discharge will be piped directly to Bear (Mahood) Creek.

2.2 Pond depths will be:

- The minimum depth of the pond will be approximately 2.0 metres.
- An additional permanent depth of approximately 1.0 metres will be provided for the use of the golf course for irrigation of the golf course. The maximum permanent depth (dead storage) of the pond will therefore be 3.0 metres.
- A depth of approximately 2.0 metres above the permanent depth will be provided for detention of storm water runoff (live storage) from the NCP area to moderate the flows to Bear Creek during peak storm events. The maximum total depth of the pond at peak storage of storm water runoff from the NCP area will therefore be approximately 5.0 metres.
- The maximum fluctuation of the pond surface from minimum depth to maximum depth will be approximately 3.0 metres.

2.3 Pond side slopes shall be as accepted by the City of Surrey. Side slopes and edge treatment which are not in agreement with the City's standards for detention ponds may be considered by the City but the City shall have the final approval for the details of the design.

I would expect that the landscaping in and about the ponds and the treatment of the waters edge will be the subject of discussion between the Golf Course and the City of Surrey.

.../2

DRAFT OUTLINE OF GOLF COURSE POND PROPOSAL CONTINUED:

2.4 Urban Systems Ltd. will establish the minimum volume required for the pond plus all requirements regarding the pond shape which are dictated by design considerations. The Golf Course will be permitted to modify the constructed shape to suit its purposes so long as the modifications meet the approval of Urban Systems Ltd., the City of Surrey and B.C. Hydro.

3.0 Landscaping:

3.1 Landscaping will be to the satisfaction of the Golf Course but must meet the criteria of the City of Surrey and the B.C. Ministry of the Environment, Lands and Parks, and B.C. Hydro.

3.2 From our discussion, landscaping will be maintained by the Golf Course as part of the consideration that is paid.

4.0 Use of Excess Excavated Material:

4.1 The Golf Course shall be permitted to use all excess excavated material resulting from the excavation of the pond for the improvements of other areas within the Golf Course subject to Ministry of Environment approvals. Material cannot vary the 100 year floodplain area.

5.0 Liabilities:

5.1 Neither the City of Surrey nor the NCP area will accept liability for the pond or its operation during or after construction. The Golf Course shall be fully liable for the pond and all risk associated with the operation of the facility just as the other ponds on the site. A legal agreement will be structured to ensure each parties responsibilities are clearly defined.

6.0 General Comment:

6.1 All works will be designed and constructed so as to minimize the impact upon the Golf Course.

There are still a number of issues to be explored and resolved but we thought it important to get this material out to you so that your Engineering and Legal Advisors might review this material if that was your wish.

GENSTAR

I would be available to meet on Friday morning at 9:00 a.m. if that suits your schedule.

Yours truly,

Lyall Armstrong
Steering Committee
Enclosure

cc: Mr. Eric Emery - City of Surrey Engineering Department
Mr. Martin Moseley - Urban Systems Ltd.

APPENDIX 5

Traffic Flow Analysis Methodology

APPENDIX 5

TRAFFIC FLOW ANALYSIS METHODOLOGY

Methodology

The East Newton Local Area Traffic Impact Study (TIS), completed in June 1995, was conducted to determine the traffic implication of the proposed East Newton development. The TIS analyzed the predicted traffic volumes and the future major network requirements with both the North and South Neighbourhood of the East Newton development. Traffic predictions were based on land use assumptions and network assumptions as discussed in the TIS report.

This NCP document focuses on the North Neighbourhood of the East Newton area. This traffic review is essentially an extension of the TIS, focusing on the local area roadway system. A number of land use and road network assumptions used in the TIS were again applied in the NCP traffic review to generate internal traffic predictions. They are listed as follows:

Existing Land Uses for North Neighbourhood:

- primarily single family dwellings on large suburban lots;
- a garden centre at the Northwest corner of 72nd Avenue and 152 Street;
- the Newton Baptist Church on the east side of 144th Street between 72nd Avenue and 76th Avenue;
- a mushroom farm located north of 78th Avenue, adjacent to the Bear Creek Area.

2004 Land Uses for North Neighbourhood:

- additional 1342 single family dwelling units;
- additional 80 townhouse units;
- an elementary school with a capacity of 640 students

Existing Network:

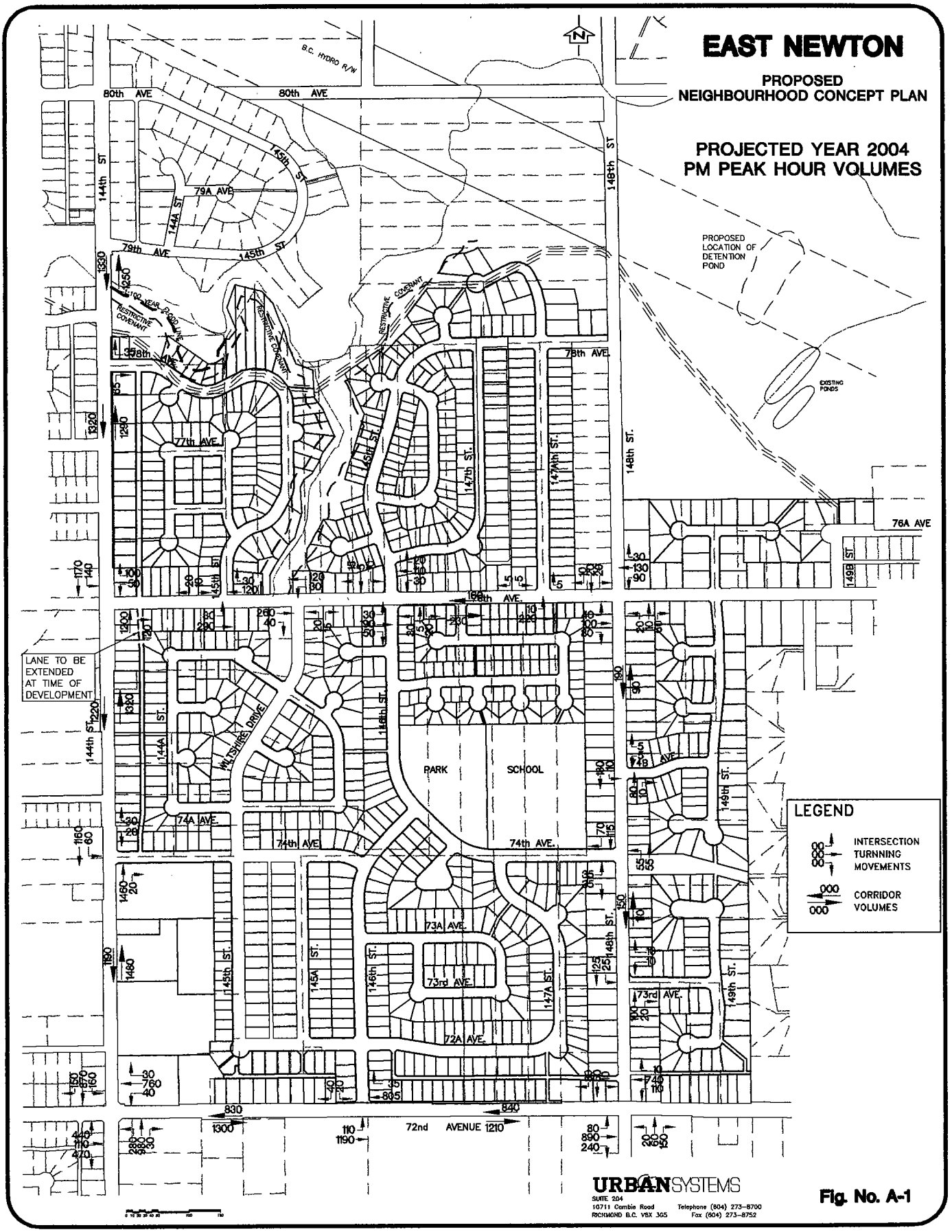
- 72nd Avenue and 144th Street are currently designated Municipal arterial roads with 2 lanes wide;
- 76th Avenue Street is a 2-lane major collector road.

Future Network Assumptions:

- the Bear Creek Connector, a secondary highway, is planned to cross the north side of the NCP area;
- 72nd Avenue will be widened to a 4-lane divided arterial from 140 Street to 152nd Street by 2002;
- the connection of 84th Avenue between 144th Street and 146th Street will be under construction by 1996 and will be completed by 1997;
- by 2002, 84th Avenue will become a continuous corridor from King George Highway to Fraser Highway. It is assumed that 30% of the through traffic on 72nd Avenue and 88th Avenue will be diverted to this new east-west corridor.

ITE trip generation rates were used to estimate the number of trips generated or attracted by the study area based on the land use assumptions listed above. Trip distribution patterns were based on the Greater Vancouver Regional District (GVRD) transportation model[1]. Trips were assigned to reasonable routes based on the existing travel patterns for the East Newton area from the 1992 GVRD travel survey. Figure A.1 summarizes the predicted traffic volumes within the study area. It should be noted that a portion of the projected eastbound left turn volumes destined to the NCP area and assigned to the intersection of 144th Street and 72nd Avenue in the TIS have been diverted to other access points of the community along 72nd Avenue. This diversion of NCP area traffic is created as a result of the delays projected for the eastbound left turns at the intersection of 144th Street and 172nd Avenue due to the removal of the planned second left turn lane as identified in the TIS which cannot be accommodated within the existing R.O.W. Therefore the traffic generated to/from the NCP area reflects the failing conditions at 144th Street and 72nd Avenue which are primarily created from projected background traffic volumes.

[1] East Newton Local Area Plan Traffic Impact Study, June 1995, pp13


EAST NEWTON
PROPOSED
NEIGHBOURHOOD CONCEPT PLAN
PROJECTED YEAR 2004
PM PEAK HOUR VOLUMES
PROPOSED LOCATION OF DETENTION POND
EXISTING PONDS
B.C. HYDRO R/W
80th AVE
79A AVE
79th AVE
78th AVE
77th AVE
76A AVE
74A AVE
74th AVE
73A AVE
73rd AVE
72A AVE
72nd AVENUE
144th ST
144A ST
145th ST
145A ST
146th ST
147th ST
147A ST
148th ST
148A ST
148B ST
149th ST
WILSHIRE DRIVE
PARK
SCHOOL
LANE TO BE EXTENDED AT TIME OF DEVELOPMENT
RESTRICTIVE COVENANT
100 YEAR FLOODLINE
LEGEND
INTERSECTION TURNNING MOVEMENTS
CORRIDOR VOLUMES
URBAN SYSTEMS
SUITE 204
10711 Cambie Road
RICHMOND B.C. V6X 3G5
Telephone (604) 273-8700
Fax (604) 273-8752
Fig. No. A-1

APPENDIX 6

Definitions of Current Funding Methods

Definitions of Current Funding Methods

APPENDIX 6

DEFINITIONS OF CURRENT FUNDING METHODS
(As provided by the City of Surrey)

1. DCC Rebates

Where a developer constructs specific works and services which may be outside the boundaries of the land being serviced or developed that are included in Surrey's "10 Year Servicing Plan" as a "growth" item. The cost of the specific works and services shall be reimbursed from only the applicable development cost charges (DCC) element only after being initially paid by the developer.

2. Development Coordinated Works (DCW)

Where the City asks the developer to construct and agrees to pay for additional works typically outside of the boundaries of the land being serviced or developed. Funds are usually directed to:

- safety related items;
- works that will mitigate the impact of development;
- works which will provide continuity of existing standards; and,
- works which will facilitate the future upgrading of City services;
- works that will logically complete a road or service or condition where redevelopment will not occur and local improvements will not be planned for small works.

This method can be initiated by the developer or the City at the time of development and is subject to approval by Surrey at the time of Development, and subject to available funds.

3. Upsizing (Water, Sanitary)

This method is used when the City requests oversizing and agrees to pay for the difference in cost to upsize and construct a new sanitary sewer or water main from the developments needs to the City's needs. Upsizing is dependent upon available funds at the time of development, and is initiated by Surrey. The City will only pay upsizing from the confirmed level of supply under the design criteria for the subject zone; not just from the minimum pipe size.

4. Frontage Latecomer

Where the City has required a developer to provide a highway or water, sewer, or drainage facilities that serve land other than the land being serviced or developed, the developer may submit a latecomers application to the City; where a specific unit charge will be levied against the benefitting lands for a 10-year term. The City shall collect a unit charge on applicants who obtain physical access to, connect to or benefit from the extension. Such a unit charge shall be paid to the City who will, in turn, pay the front-ender on an annual basis.

This method may be initiated by the developer only if front-ending a utility that will benefit his development, and benefit others as per the Latecomers procedure manual. The developer can then present a latecomer application to the City along with the required fees. The latecomer will require those deemed to be benefitting from the utility to pay a unit charge as per the Latecomers procedure manual prior to obtaining physical access. The use of this method is dependent on the development scenario and on the financial benefit to the developer at the time of development.

5. Area (Sanitary Pump Station and Force Main) Latecomer

Where a sanitary pump station and/or gravity lines and/or force main that can serve lands other than those being serviced or developed, the developer may submit an area latecomers application to the City, where a specific unit charge will be levied against the benefitting lands for a 10-year term. The City shall collect a unit charge from applicants who obtain physical access to, connect to or benefit from the works. Such a unit charge shall be paid to the City, who will in turn, pay the front-ender on an annual basis (as per the Latecomer Procedure Manual).

This method may be initiated by the developer only if front-ending a utility that will benefit his development, but will benefit a larger catchment as well. The developer can then present a latecomer application to the City along with the required fees. The latecomer will require those deemed to be benefitting from the utility to pay a unit charge as per the Latecomer Procedure Manual prior to obtaining physical access. The use of this method is dependent on the development scenario and on the financial benefit to the developer at the time of development.

Note: Consultants must refer to and follow the current Latecomer Procedure Manual.

APPENDIX 7
Cost Estimating Information

City of Surrey Unit Costs for Construction Estimates

Estimated Cost of the Detention Pond

City of Surrey Amenity Study

City of Surrey Unit Costs for Construction Estimates in NCP

CITY OF SURREY UNIT COSTS FOR CONSTRUCTION ESTIMATES IN NCP

Road Works (including Engineering, Administration, GST, etc,. equalling a 50% factor)

Sidewalk	$75/m
Concrete Curbing	$37.5/m
Boulevard Strip	$21/m
Pavement Widening	$45/sq.m.
Streetlights and Conduit	$150/m
Asphalt Overlay	$9/sq.m.

***Sanitary and Storm Works** (including Engineering, Administration, GST, etc., equalling a 50% factor)

Pipe (mm)	Cost
250	$360/m
300	$375/m
375	$435/m
450	$480/m
525	$510/m
600	$570/m
675	$630/m
750	$765/m
900	$930/m
1050	$1080/m
1200	$1260/m
1350	$1455/m
1500	$1665/m

Major Collector Construction Costs

Interim Standard (8.5m)

Including - detail enclosure, gravel swale, streetlights, pavement widening, overlay, sidewalk one side, catch basins at ultimate and 50% factor for engineering, contingency, administration, GST, etc.
$1,014/m**

***Water Works** (including Engineering, Administration, GST, etc., equalling a 50% factor)

Pipe (mm)	Cost
200	$375/m
250	$390/m
300	$420/m
350	$465/m
400	$480/m
450	$525/m

*Unit costs include catch basins, manholes, tees, hydrants, valves, house services, restoration, rehabilitation, etc. Diversion structures and PRVs have been estimated in the specific item costs shown in Tables 8.1a through 8.1d.

** In locations where a trunk storm sewer and major collector widenings are proposed as DCC elements, Surrey will only fund the storm sewer in the storm DCC rebate or credit. This means that the unit cost for major collector rebate will be lower than $1,014/m as the storm sewer cost will not be included. Storm sewers costs will be in the trunk cost in this situation. Note that Surrey rebates or credits only on actual costs not estimates in any case.

Estimated Cost of the Detention Pond

Golf Course Detention Pond Option

Item	Description	Unit	Quantity	Unit Price	Amount
1.0	**Earthworks**				
1.1	Stripping and Disposal	m^3	5,250	14.00	$ 73,500
1.2	Cut to fill	m^3	19,767	$ 5.50	$ 108,719
	Subtotal				$ 182,219
2.0	**Piping**				
2.1	1050 mm diameter Inlet Piping	m	220	$ 720.00	$ 158,400
2.2	1050 mm diameter Outlet Piping	m	180	$ 720.00	$ 129,600
2.3	Manhole	ea	2	$ 4,000.00	$ 8,000
2.4	Outlet Control Structure	ea	1	$ 20,000.00	$ 20,000
2.5	Pond Inlet/Outlet Headwalls	ea	2	$ 5,000.00	$ 10,000
2.6	Creek Outlet Structure	Ls			$ 15,000
	Subtotal				$ 341,000
3.0	**Topsoil and Hydroseeding**	m^2	12,000	$ 4.60	$ 55,200
	Subtotal				$ 55,200
	Grand Subtotal				$ 578,419
	50% Engineering and Contingency, G.S.T., etc.				$ 289,209
	TOTAL				$ 867,628

WET POND ON GOLF COURSE PROPERTY
OPTION

- REQUIRED VOLUME FOR STORAGE = 17,480 cu.m.
- MAXIMUM ELEVATION FOR STORAGE = 16.0m

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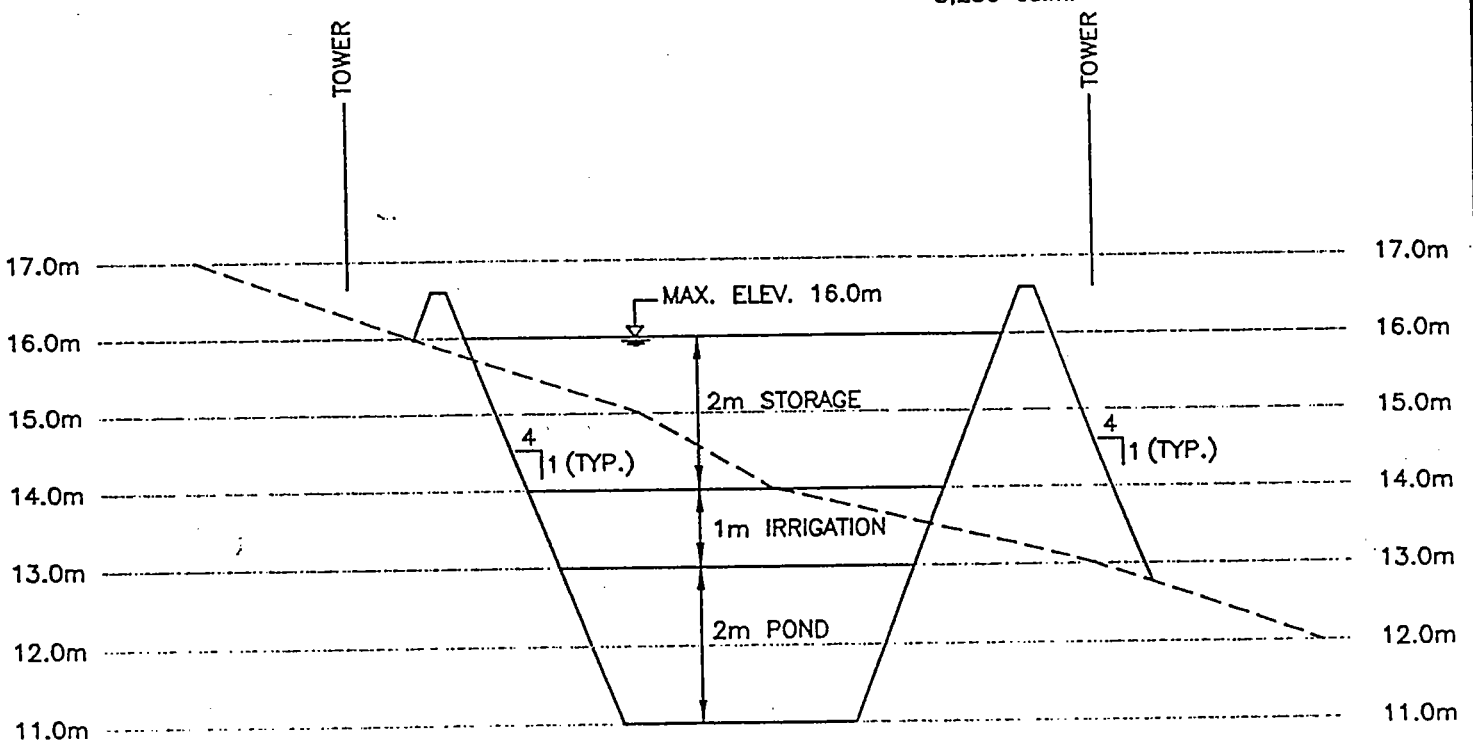


X-SECTION 1

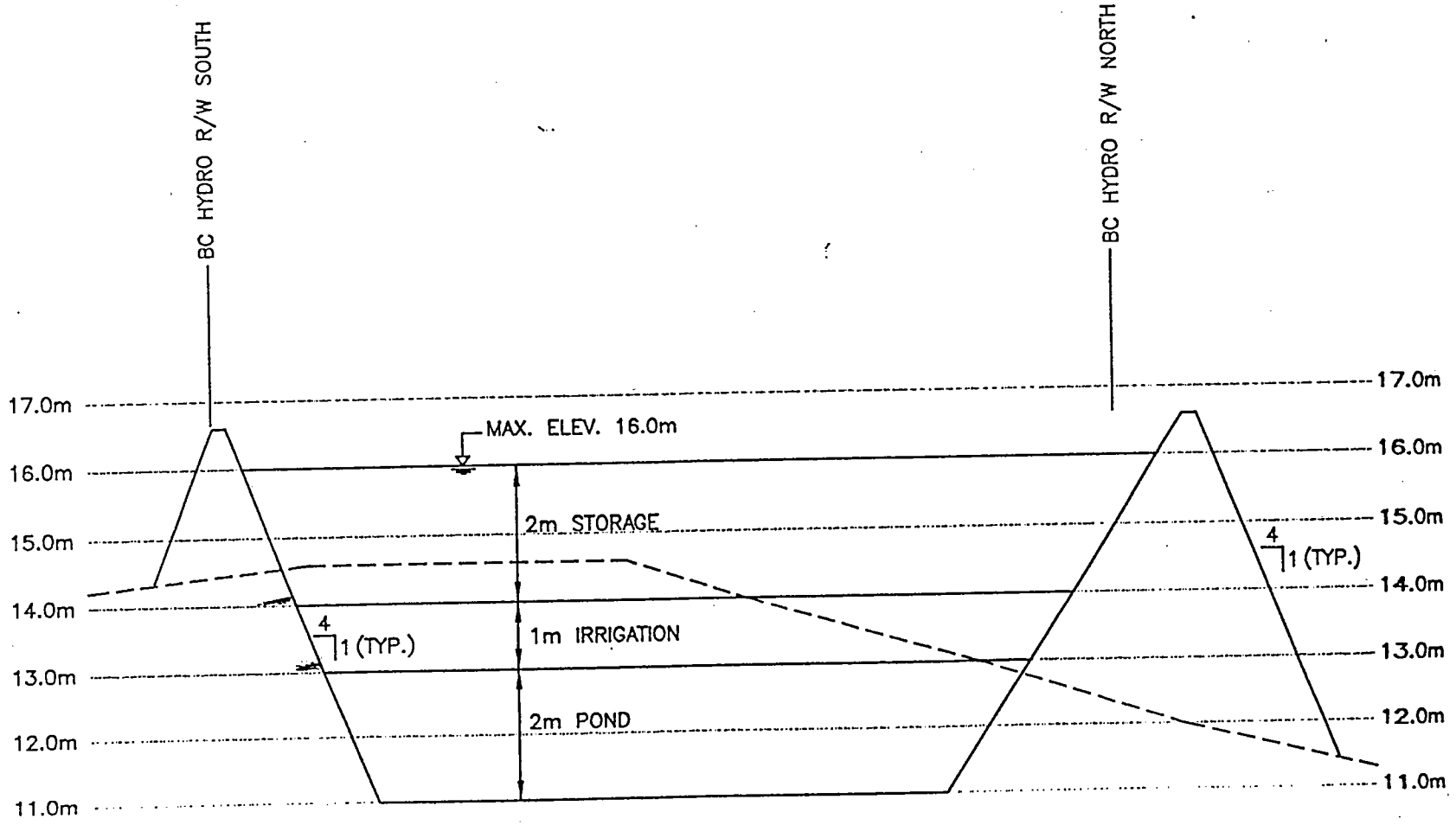
URBAN SYSTEMS							GOLF COURSE POND TYPICAL SECTION
DATE DWN DEC.,1995	NO.	DATE	REVISIONS	BY	APP'D	DWN: CHK:	SCALE 1:1 / DWG NB. 1

ACAD13 12/04, 12:37 POND-SEC PLOT 1=1

URBAN SYSTEMS

DATE DWN: DEC., 1995

NO.	DATE	REVISIONS	BY	APP'D



X-SECTION 2

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GOLF COURSE POND
TYPICAL SECTION

City of Surrey Amenity Study

April, 1996

CITY OF SURREY AMENITY STUDY
NEIGHBOURHOOD CONCEPT PLAN (NCP) PROGRAM
PROPOSED AMENITY/FACILITY CONTRIBUTION FORMULAS

SUMMARY OF PROPOSED AMENITY CONTRIBUTIONS

Amenity Category	Recommended Contribution
Police Protection *This contribution is based upon a projected growth rate of 5% paying for 5% of the average annual capital expenditure for the next 10 years.*	$50.00 per unit
Fire Protection *This contribution is based upon a projected growth rate of 5% paying for 5% of the average annual capital expenditure for the next 10 years.*	$216.00 per unit
Library Materials *This contribution is based upon 1.5 resource materials (at $25 each) per capita (3 people per household).*	$112.50 per unit
Park Development *The contribution toward park development within NCPs will be determined by the Parks & Recreation Department and will be based upon the actual estimated costs of park/facility development in each NCP area.*	Based on actual costs of construction *Could range from approximately $300 to $600 per unit depending on the type of development and the number of units in the NCP area.*
TOTAL AMENITY CONTRIBUTION	**$378.50 per unit plus parks development costs**

The formulas for police and fire protection are based on a projected population growth of 5% per year which translates to 14,250 people per year. 5% of the average annual capital expenditure is $23,250 for the RCMP, and $145,000 for the Fire Department. These are both derived from the respective 10 year capital plans.

Contributions from institutional, industrial and commercial development would be based upon an equivalency factor of *1 hectare of land is the equivalent to 15 residential units.* These uses will be required to contribute toward fire and police protection only.

East Newton North Neighbourhood

Cost estimates, Public Amenities, Parks & Recreation

Description	Quantities	Cost
Joint School Park site	6.00	$120,000.00
Soccer field & Ball diamond		$350,000.00
Benches and tables	10	$9,000.00
Bike rack	2	$1,000.00
Landscaping		$35,000.00
Signage		$5,000.00
Neighbourhood Park	0.20	$4,000.00
Benches and tables	10	$9,000.00
Playground		$30,000.00
Signage		$1,500.00
Walkways (square m)	2600	$67,600.00
Fencing	350	$17,500.00
Bike baffle	3	$3,000.00
Arborist services		$1,200.00
Public consultations		$6,000.00
Total		**$652,600.00**