

***EAST NEWTON SOUTH***

***NEIGHBOURHOOD  
CONCEPT PLAN***

***FINAL REPORT***

**PLEASE NOTE:**

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Item No. C376 Stage 2 Final Report East Newton South Neighbourhood Concept Plan File: 2350-003/2

It was Moved by 7  
Seconded by 6  
That Council:

*all seats vac.*  
✓

1. Approve the final and complete Neighbourhood Concept Plan (NCP) for East Newton South (Appendix I);
2. Approve the arrangements, terms and conditions specified in the East Newton South Neighbourhood Concept Plan as a means of managing the development and general provision of services, amenities, and facilities for this new neighbourhood;
3. Amend the East Newton Local Area Plan to reflect the recommendations contained in the East Newton South Neighbourhood Concept Plan;
4. Authorize staff to draft the following by-laws to implement the provisions of the East Newton South Neighbourhood Concept Plan:
  - a. An amendment to Zoning By-law, 1993, No. 12000, as amended, to enact the approved bonus density provision for the East Newton South Neighbourhood Concept Plan area;
  - b. An amendment to the City of Surrey Land Use and Development Application Fees Imposition By-law, 1993, No. 11631, as amended to authorize the payment of additional application fees to recover the costs of preparing the East Newton South Neighbourhood Concept Plan; and
  - c. A by-law to adopt the East Newton South Neighbourhood Concept Plan as an Official Community Plan By-law.

*3 in 2  
7:03 P.M.*

It was Moved by  
Seconded by  
That the foregoing motion be amended by  
deleting Section 4.c.

RES.R97-

Carried

The main motion, as amended, was then put and

RES.R97-

Carried



# Corporate Report

NO: C376

COUNCIL DATE: DEC. 2/97

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## COUNCIL-IN-COMMITTEE

TO: Mayor & Council DATE: November 21, 1997  
FROM: General Manager, Planning & Development FILE: 2350-003/2  
SUBJECT: Stage 2 Final Report East Newton South Neighbourhood Concept Plan

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## RECOMMENDATION

It is recommended that Council:

1. Approve the final and complete Neighbourhood Concept Plan (NCP) for East Newton South (Appendix I);
2. Approve the arrangements, terms and conditions specified in the East Newton South Neighbourhood Concept Plan as a means of managing the development and general provision of services, amenities, and facilities for this new neighbourhood;
3. Amend the East Newton Local Area Plan to reflect the recommendations contained in the East Newton South Neighbourhood Concept Plan;
4. Authorize staff to draft the following by-laws to implement the provisions of the East Newton South Neighbourhood Concept Plan:
  - a. An amendment to Zoning By-law, 1993, No. 12000, as amended, to enact the approved bonus density provision for the East Newton South Neighbourhood Concept Plan area;
  - b. An amendment to the City of Surrey Land Use and Development Application Fees Imposition By-law, 1993, No. 11631, as amended to authorize the payment of additional application fees to recover the costs of preparing the East Newton South Neighbourhood Concept Plan; and
  - c. A by-law to adopt the East Newton South Neighbourhood Concept Plan as an Official Community Plan by-law.

## INTENT

The intent of this Report is:

1. To provide an overview of the complete and final East Newton South Neighbourhood Concept Plan, including a summary of the planning process and methods of implementing the Neighbourhood Concept Plan;
2. To outline the resolution of outstanding issues identified in the Stage 1 Report and through subsequent discussions with the residents in the East Newton South Neighbourhood Concept Plan area, in relation to environmental, residential, and transportation issues;
3. To review minor adjustments to the Stage 1 Neighbourhood Concept Plan brought about during the preparation of Stage 2;
4. To summarize the funding mechanisms for amenities proposed in the East Newton South Neighbourhood Concept Plan;
5. To describe the by-laws needed to implement the East Newton South Neighbourhood Concept Plan; and
6. To highlight concerns expressed by certain property owners throughout the planning process that were not able to be addressed by the Neighbourhood Concept Plan.

## BACKGROUND

In March 1993, Council approved the East Newton Local Area Plan which formed the basis for guiding the general pattern in the East Newton area, and sets out the general land use plan and development policies for the preparation of detailed Neighbourhood Concept Plans in the area. Three Neighbourhood Concept Plan areas have been identified in East Newton: the North neighbourhood (north of 72 Avenue), which was granted final approval by Council on July 30, 1996; the Industrial Business Park (east of 152 Street), for which a planning process has recently be re-initiated; and the South neighbourhood (south of 72 Avenue) (Appendix IV). The Neighbourhood Concept Plan process for the South neighbourhood of East Newton commenced in June 1994 with the consent of 60% of property owners.

The East Newton South Neighbourhood Concept Plan was prepared under the direction of the East Newton Steering Committee, which is made up of 18 property owners in the area, the Neighbourhood Concept Plan planning consultant, and City representatives. Meetings of the Steering committee were held at key steps in the planning process to ensure proper neighbourhood consultation and input during the Neighbourhood Concept Plan preparation process.

Following an intensive public consultation process and several Public Open Houses, Council granted approval to the physical land use plan component of the East Newton South Neighbourhood Concept Plan (Stage 1) on March 19, 1996, and authorized commencement of the Stage 2 Neighbourhood Concept Plan process based on the type, size, location, and densities of the specific land uses, as well as based on the conceptual road hierarchy and general servicing concepts (Appendix II and V).

The Neighbourhood Concept Plan proponents were required to address all conditions and requirements identified at the time of Stage 1 approval. Further, City Council stipulated that the Neighbourhood Concept Plan proponents were to prepare a comprehensive financial plan that will demonstrate adequate funding provisions for infrastructure and other priorities.

Funding solutions to address the major funding constraints for sanitary and storm sewer services have resulted in some unusual delays in finalizing the Neighbourhood Concept Plan.

It is noted that a report on servicing and funding from the General Manager of Engineering is to be considered in conjunction with this report.

## DISCUSSION

### Overview of the Land Use/Development Concept

The East Newton South Neighbourhood Concept Plan area consists of approximately 215 existing units and 178 ha. (440 acres) of land area, the majority of which is considered developable. The approved Stage 1 Neighbourhood Concept Plan indicates that approximately 1,705 residential units can be built to accommodate the projected population of about 5,195 at buildout.

- (a) The proposed neighbourhood will be dominated by single-family development, and will include a central node comprising a joint Elementary School/Neighbourhood Park site.
- (b) A small, local commercial centre is proposed at the intersection of 72 Avenue and 152 Street.
- (c) A new T.E. Scott Elementary School and park site is proposed to serve the new neighbourhood, covering approximately 5.26 ha. (13 acres) of land in the northerly portion the plan area. Approximately 3.9 ha. (9.6 acres) is the neighbourhood park component. The replacement school will have increased capacity, be centrally located on 150 Street, and have direct access to park space without having to cross a street.
- (d) In addition to the proposed active park site adjacent to the school, two other major sites are proposed to be acquired and developed for active and passive open space use: a 1.6-ha (4-acre) site between 67 Avenue and 67A Avenue west of 150 Street for children and passive recreation, and a 1.6-ha (4-acre) passive park site

between 150 Street and 151 Street south of 70A Avenue which includes a significant stand of mature trees.

- (e) As approved by Council, the Neighbourhood Concept Plan generally conforms to the spirit and intent of the Local Area Plan for East Newton South. It represents a detailed development pattern and policies that are supported by the Steering Committee and the property owners.

#### Overview of the Funding and Amenity Provisions

The Neighbourhood Concept Plan process has resulted in the identification of capital requirements for specific amenities and facilities that are required to support the projected development of this neighbourhood. Based on the cost of these amenities, a corresponding funding proposal has been developed. It is based on a detailed review of the general amenity requirements by City departments and the public.

Overall, this neighbourhood will require \$1,582,187.50 in funds that will be shared equally by at least 1,525 new dwellings to cover the costs of fire and police protection, library books and materials, and to develop the neighbourhood and linear park facilities. The total amenity contribution per unit will be approximately \$1037.50.

The amenity funding arrangements are as follows:

- (a) The development of a 3.9 ha. (9.6 acre) active park adjacent to the school, a 1.6 ha. (4 acre) passive park, 1.6 ha. (4 acre) playground park, and the walkway and trail system will require approximately \$1,005,409.00 in capital, or contributions of approximately \$659.00 per dwelling unit. Specific park amenities that will be required include development of the active park (soccer field, baseball diamond, benches and tables, bicycle rack, landscaping and signage), passive park facilities (benches and tables, playground and signage), and fencing and bike baffles for the walkway system.
- (b) Surrey Library has determined that a contribution of \$112.50 per dwelling unit would be appropriate to cover the capital costs for library materials and services. Consequently, a total of \$171,562.50 will be contributed from this neighbourhood towards library materials such as books.
- (c) Future development in this neighbourhood will require upgrading of existing fire and police protection facilities. The required per unit contribution for both services has been established at \$266.00, resulting in a total of \$405,650.00 being contributed from the neighbourhood to cover upgrading of police and fire protection services.

#### Public Consultation

Both City staff and the Consultants had extensive consultation with property owners throughout the planning process. In addition to regular Steering Committee meetings,

several public Open Houses were held to enable the public at large to view and provide written comments on the Neighbourhood Concept Plan.

General support for the final Neighbourhood Concept Plan was indicated at the final Open House held on November 12, 1997. The meeting was attended by approximately 150 people, and information was provided about the servicing and financial details of the Neighbourhood Concept Plan. Residents were asked to indicate their support for the final Neighbourhood Concept Plan by completing a survey form which was distributed at the meeting and during the following week at the Planning and Development Department. Results indicated that in excess of 80% of households responding supported the Neighbourhood Concept Plan, including the land use, servicing, funding, and engineering phasing strategy.

#### Concerns Expressed by Property Owners

- (a) Mr. B. Ajula property (14932 - 72 Avenue) - Concern has been expressed by the owner of 14932 - 72 Avenue regarding the designation of a future road along the easterly portion of the property. The Neighbourhood Concept Plan road layout requires realignment of 150 Street to avoid several consecutive T-intersections between 148 and 152 Streets, and address safety concerns. The owner has expressed disagreement with the designation of the full road requirement on his property.

Numerous options were considered in an attempt to have the road shared amongst properties in the area, however, the adjacent lots to the east are developed with existing dwellings, and have no further development potential. No opportunity therefore exists to acquire the road on adjacent sites. 150 Street is designated as a Major Collector, and the road is a necessary component of the Neighbourhood Concept Plan. It is recognized that road dedications are customarily shared amongst properties, and the matter will be resolved through negotiation at the development stage to the mutual satisfaction of the owner and the City.

#### Resolution of Stage 1 Outstanding Issues

Outstanding issues that were identified at Stage 1 (Appendix V) or emerged from the detailed Stage 2 Report have been resolved as discussed below:

- (a) *School Site Acquisition Issues*

The Surrey School District has identified the need for a new Elementary School on 150 Street to replace the existing T.E. Scott Elementary School located at 148 Street, which is currently at capacity. The 1998-2002 Capital Plan identifies that site acquisition for the replacement Elementary School will take place in 2000, with requests for Planning and Construction funds taking place in 2003 and 2004. The new T.E. Scott School is expected to be in operation in 2004, if funding is available. However, acquisition of the new school site will require the disposition of the existing T.E. Scott site, which would not occur until the new school is built. Funding will therefore be required in the short-term to address the cash flow short



fall between the new school development and disposition of the existing schools site.

The issue of lack of school funding affects a number of Neighbourhood Concept Plans where new school sites have been identified. The Ministry of Education is not currently releasing funds for school acquisition and development.

In response to the universal issue of school capacity and lack of school funding, City Council established a Task Force to examine ways to ensure construction of schools will meet the demands generated by growth and development in Surrey. The Task Force was comprised of 70 people representing a wide range of disciplines and interests. Following a series of meetings and discussions between May and October 1997, the Task Force identified seven recommendations to further facilitate the timely and economic construction of new school facilities (Appendix VI). On November 18, 1997, Council received the Task Force report and forwarded it to the Ministry of Education, Skills and Training, and the Surrey School District for consideration and implementation. Discussions with these agencies are on-going.

(b) *Adjustment to Proposed Elementary School and Neighbourhood Park location*

The Stage 1 Land Use Plan proposed relocation of T.E. Scott Elementary School from its present location on 148 Street to a more central location on 150 Street. The existing T.E. Scott School is at currently at capacity, and 148 Street is a major collector and carries a significant amount of traffic; relocation to 150 Street would create a more central location, reduce the traffic impact, and address safety concerns. In addition, the relocation would permit development of an adjacent park with unimpeded access. The existing school location would necessitate crossing of 148 Street to access the park, therefore creating potential vehicular-pedestrian conflicts. The proposed location would also establish a more central focal point for the community, as outlined within the East Newton Local Area Plan.

The school/park configuration shown on the Stage 1 Land Use Plan necessitates a land exchange between the School District and the Archdiocese of Vancouver for property occupied by T.E. Scott School and land held by the Archdiocese on the east side of 148 Street identified for future park. The Stage I Council Report indicated that if the proposed land exchange could not be completed, an adjustment to the park location would be required. The land exchange has been unsuccessful, therefore the alternative park location as shown on the Stage 1 Land Use Plan (Appendix III) will apply. The park has been shifted south of the Archdiocese property, which will be developed in the future with a school/church use, and the existing T.E. Scott School site has been designated for single family residential use.

(c) *Environmental Considerations*

- (i) Setbacks to Hyland Creek: Hyland Creek is located along the southerly boundary of the Neighbourhood Concept Plan area, and is designated as a sensitive watercourse. Land uses adjacent to Hyland creek will be required to provide appropriate setbacks to comply with the Ministry of Environment guidelines. As such, developments adjacent to the creek must be setback from the top of the bank a minimum of 15m for single family residential uses (6 unit per acre gross), and 30m for institutional, commercial, or residential uses in excess of 6 units per acre. All other Ministry requirements will also have to be met at the time of development.
- (ii) Ministry of Environment Approval: Discussions were held with Ministry of Environment representatives to secure the necessary approvals for the servicing plan, including the stormwater management strategy, and other issues identified by the Engineering Department and the Ministry. Ministry of Environment approval has now been obtained.

(d) *Phasing of Development Servicing and Detailed Standards for Roads, Utilities, and Walkways*

The proposed phasing strategy has now been established, and is outlined in the report from the General Manager of Engineering, which is to be considered in conjunction with this report.

The Stage 2 Neighbourhood Concept Plan Report identifies the proposed location and type of utilities within the Neighbourhood Concept Plan area (Appendix A of Stage 2 Report). A standard minimum walkway width (5 meter right-of-way and 4 m walkway surface width) has been previously identified and is currently being secured from developments in the area, and larger open space corridors (16m, 25m) corridors will be developed to provide direct access to neighbourhood parks.

(e) *Design Guidelines for Townhouse, Commercial, Small-lot Housing Sites, and East Newton Gateway*

Specific Design Guidelines were included in the Stage 1 Report, and these will be augmented by Development Permit Guidelines adopted as part of the Official Community Plan (1996) for Multi-family development (Appendix VII). The East Newton Local Area Plan indicates that a special design feature should be included at the intersection of 72 Avenue and 144 Street to provide a sense on entrance to East Newton. The Stage 2 Report provides a conceptual design and several principles for the creation of the gateway feature (Appendix VIII).

Implementation of the East Newton South Neighbourhood Concept Plan

Following Council's approval of the Neighbourhood Concept Plan, a number of initiatives must be undertaken to implement the East Newton South Neighbourhood Concept Plan as follows:

- (a) Amendment to 1993 City of Surrey Zoning By-law No. 12000

Pursuant to Sections 378 and 963.1 of the *Municipal Act*, the current Zoning By-law (No. 12000) must be amended in order to accommodate bonus densities in exchange for contributions towards the specified amenities that have been identified in the final Neighbourhood Concept Plan. An amendment by-law will be prepared and forwarded for consideration by City Council.

- (b) Amendment to Surrey Land Use and Development Application Fees Imposition By-law

The costs associated with the preparation of the Neighbourhood Concept Plan for this neighbourhood to date have been shared between participating property owners and the City. 105 properties in the Neighbourhood Concept Plan area contributed a total of \$30,038.96 toward the costs of plan preparation, based on an individual charge of approximately \$168 to \$170 per acre. The total plan preparation cost is approximately \$102,631.75, therefore an outstanding balance of approximately \$72,547.79 must be recouped from property owners who did not yet contribute a plan preparation fee. Plan preparation fees for individual properties will be determined based on the number of developable properties which have yet to contribute and the total amount outstanding, and will be required on a per unit basis at the time of rezoning.

- (c) Preparation of the Neighbourhood Concept Plan By-law

Surrey's new Official Community Plan requires that Neighbourhood Concept Plans be adopted by by-law. It is noted that a report and recommendations regarding the procedural implications of this initiative will be forwarded to City Council in the near future.

- (d) Development Applications

There are a number of in-stream development applications in this Neighbourhood Concept Plan area which will be evaluated in the context of the approved Neighbourhood Concept Plan (Appendix IX) If in conformance with the plan and complete, these applications will be eligible for consideration by City Council.

## CONCLUSION

The East Newton South Neighbourhood Concept Plan illustrates land uses, densities, and a development pattern that are in general conformity with the approved Local Area Plan and are consistent with the approved Official Community Plan. In addition, it includes a reasonable amenity and phasing strategy that has received general support from the owners and the public.

Should Council approve the recommendations of the General Manager of the Engineering Department regarding the associated servicing and financial issues, it is recommended that City Council approve the attached East Newton South Neighbourhood Concept Plan and the corresponding recommendations outlined in this Corporate Report.



Lehman O. Walker  
General Manager  
Planning and Development Department

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### Appendices

- Appendix I East Newton South Neighbourhood Concept Plan (Stage 2)
- Appendix II Approved Land Use Concept Plan (Stage 1)
- Appendix III Adjustment to Park Location
- Appendix IV East Newton- NCP Areas
- Appendix V East Newton South NCP Stage 1 Council Report
- Appendix VI Report of the Task Force on Funding New Schools
- Appendix VII East Newton South NCP and Official Community Plan Design Guidelines for Townhouse Developments
- Appendix VIII Details of Proposed East Newton Gateway
- Appendix IX In-Stream Development Applications in the Area

Item No. C378

East Newton South Neighbourhood Concept Plan  
South of 72 Avenue - Stage 2 Report  
File: 2350-003

It was

Moved by  
Seconded by

That the Stage 2 Report for the East Newton South NCP be adopted subject to the following:

- That the community detention pond sites within each of the <sup>two</sup> catchment areas be acquired or protected to the City's satisfaction by the developers before development within each catchment area can proceed.
- That the dyke improvements and the floodbox construction be provided by the developers at the time of approval of the first development application within that catchment area.
- That from a development phasing perspective, development be allowed to proceed within each drainage catchment area independently provided the developers can fund the necessary infrastructure without assistance from the City other than by DCCs payable by the developers within the NCP.
- That DCC drainage works that cannot be funded by the NCP, be funded in the future by the City only when excess City wide collected DCC funds are available and the works have become City priorities. This may delay some developments.
- That approvals for the proposed drainage system be received from Ministry of the Environment and the Department of Fisheries and Oceans.
- That developments follow the servicing and road layouts as proposed in the Stage 2 Report or as revised by the applicant subject to the City's approval.
- That it is understood that the report is based upon the best information currently available and costs estimated based upon this information. As such, solutions and costs may change as more details become available leading to revisions to the report.
- That financing of the NCP infrastructure will be provided by the developers with no funds being provided by the City other than Development Cost Charges collected from developers of benefiting properties.
- Council amend the 10 Year Servicing Plan to include the proposed additional works.
- All developments must comply with all City By-laws, Standards, Specifications and Policies.

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- That approvals for the proposed drainage system be received from Ministry of the Environment and the Department of Fisheries and Oceans.
- That developments follow the servicing and road layouts as proposed in the Stage 2 Report or as revised by the applicant subject to the City's approval.
- That it is understood that the report is based upon the best information currently available and costs estimated based upon this information. As such, solutions and costs may change as more details become available leading to revisions to the report.
- That financing of the NCP infrastructure will be provided by the developers with no funds being provided by the City other than Development Cost Charges collected from developers of benefiting properties.
- Council amend the 10 Year Servicing Plan to include the proposed additional works.
- All developments must comply with all City By-laws, Standards, Specifications and Policies.

## DISCUSSION

Generally this Neighbourhood Concept Plan area has been provided with infrastructure adequate to service the development of the area with the exception of drainage and sanitary sewer facilities for the area below the GVS&DD trunk.

The report identifies the need for the following significant works:

- two community detention ponds
- improvements to the storm outfall east of 152 Street along the alignment of 71 Avenue
- the need for a sanitary sewer pump station for the area below the GVS&DD trunk immediately adjacent to 152 Street and north of 68 Avenue
- arterial road widening of 72 Avenue and 144 Street

The Stage 2 report indicates that this NCP can be self financing except for the drainage and major collector requirements where assistance from surpluses elsewhere will be required. It is however important to note that as part of the NCP process, the consultants consider the specific servicing needs of the NCP. The primary focus is on direct infrastructure needs within or immediately adjacent to the NCP boundaries. In order to support these new works, there are also overall infrastructure requirements external to the NCP such as:

- supply mains, reservoir and pump capacities for waterworks
- new or upgraded pump stations, trunk mains for sanitary
- new or upgraded pump stations, dykes and trunk mains for drainage, and
- road improvements to provide additional capacity for the new growth.

These works are specifically included in the 10 Year Servicing Plan and are funded in part by the surplus DCCs generated by some of the NCPs. When this report refers to surplus DDC funds, they are in fact not surplus to the City but only surplus to the direct needs of the NCP.

The engineering and financing issues have been reviewed and recommendations have been prepared as outlined below.

## TRANSPORTATION

The East Newton South Neighbourhood is currently served by three arterial roads, 148 Street to the west, 152 Street to the east and 72 Avenue to the north. It is proposed that 72 Avenue from 144 to 152 Streets and 144 Street from 64 to 72 Avenues be widened to 4 lanes by 2004 and 2006 respectively. The widening of 152 Street has already been completed. The City wide traffic model suggests the upgrading to 72 Avenue and 144 Street may not be required in the next 10 years.

Two collectors, 68 Avenue and 148 Street, are located within the NCP. Access from the NCP to 152 Street will be limited to right in and out only except at 72 Avenue and 68 Avenue.

The Stage 2 Report recommends that the current road standard for maximum grades of 12% on 70A Avenue be relaxed to allow 14% for a short section, if required, when the road is reconstructed. The current grade of 70A Avenue is slightly over 15% on sections between 150 and 152 Streets. The relaxation will require a development variance permit.

No direct access will be permitted for new single family homes fronting 72 Avenue or 152 Street. They will be serviced by a rear lane or frontage road.

Consideration has been given to pedestrian and bicycle circulation using a pathway system, sidewalks, bicycle paths along arterials and wide travel lanes along collector roads.

For arterial road widening, the existing 10 Year Servicing Plan includes \$4,000,000 for this NCP. The Stage 2 report recommends that 72 Avenue widening be included in the 10 Year Servicing Plan at a value of \$3,500,000. The total Arterial Road DCC's payable by the NCP is \$7,594,000.

The existing 10 Year Servicing Plan includes \$2,370,000 for growth related non-arterial widening and signalization within the NCP area. The Stage 2 Report identifies an additional \$160,000 for traffic signals proposed to be added to the 10 Year Servicing Plan. The additional demand that the NCP places upon areas outside of the NCP area are not included in the Stage 2 Report.

Based upon current servicing plans, proposals and estimates, the NCP will have a shortfall of \$600,000 in Major Collector Development Cost Charges for road works required to provide the Municipal road services within the NCP at build-out. This shortfall may mean that the construction of some major collector works will be delayed until the City has excess DCC funds available. Since the majority of the other NCP's that have been approved have surpluses in the Major Collector category this should not present a problem in the future.



## **TRANSIT**

Transit services are currently provided along 152 Street connecting Guildford Town Centre to White Rock Centre. A bus service also operates along 144 Street between 72 and 60 Avenue. Indications are that transit will also be provided on 68 Avenue between 148 and 144 Streets and on 148 Street from 68 Avenue north.

## **SANITARY SEWER**

Sanitary sewer services to some of the properties within this NCP exist. This Neighbourhood slopes to the south and east and is currently serviced by the existing GVS&DD trunk sewer. A trunk sanitary sewer also exists on 66A Avenue which has adequate capacity to service the NCP but development from other areas outside of the NCP also use this capacity. Another trunk sewer is planned along 64 Avenue to provide relief in the future for this trunk. As such, the available capacity of the trunk on 66A Avenue must be monitored as development within the NCP takes place such that the timing of any relief works can be scheduled to coincide with the needs of the NCP.

The GVS&DD trunk sewer can service the majority of the NCP by gravity but the area between the trunk and 152 Street is below it and must be serviced by a lift station. This lift station is also proposed to service the proposed business park area east of 152 Street.

Due to the high costs of the ultimate lift station to service the larger catchment area, the Stage 2 report recommends that the area below the sanitary trunk be serviced by a temporary lift station to be constructed at the developers' expense. The developers will be responsible for the cost of the ultimate connection to the future station and for the right-of-way required to connect their developments to the ultimate lift station. The maintenance costs of this interim station are also to be paid by the developers until the ultimate lift station is constructed using Development Cost Charges in the future.

The City's 10 Year Servicing Plan includes \$1,216,000 for the ultimate lift station to be constructed east of 152 Street. There are no sanitary sewers within the NCP that qualify for Development Cost Charge financing.

Based upon current servicing plans, proposals and estimates, the NCP will ultimately pay \$1,429,000 in Sanitary Development Cost Charges. These funds will be used in part to finance the ultimate lift station estimated to cost \$1,216,000. Therefore this NCP will have paid \$213,000 beyond that which is required to provide Municipal sanitary sewer services within the NCP at build-out.

## **WATER SUPPLY**

This Neighbourhood Concept Plan will not require significant improvements to the water supply system to support the proposed development. The area is currently well serviced by the system previously installed. The supply for this area comes from the Newton Pump Station.

In order to provide for development, the Stage 2 report identifies nine DCC rebatable improvements to be made to the water system. Of these 4 are replacements of existing

mains. The remaining 5 items include a pressure reducing station and 300 diameter mains at various locations.

The City's 10 Year Servicing Plan includes an amount of \$422,000 for waterworks required for this NCP. This NCP will generate Water Development Cost Charges in the amount of \$1,649,000 resulting in a surplus of \$1,227,000.

## STORM DRAINAGE

This neighbourhood can be broken down into 3 catchment areas. The western portion of the NCP (catchment area 1) flows to Hyland Creek at 148 Street. The north east area (catchment area 2) drains to the existing 71 Avenue ditch east of 152 Street that flows to Bear Creek. The south east area (catchment area 3) south of 68 Avenue flows to Hyland Creek near 152 Street.

The Stage 2 report indicated that catchment area 2 requires improvements to the 71 Avenue ditch. The dyke constructed along the ditch is currently inadequate and must be raised to an elevation of 2.9 meters. One additional floodbox must also be added at the outlet to Bear Creek. A right of way approximately 35 meters wide will be required in order that these works can be constructed. To avoid increased flooding of the farm lands, these drainage works must be constructed before development within this catchment area can proceed.

The report further indicates that both the catchment areas that drain to Hyland Creek will require community detention ponds to be constructed before development can proceed in order to minimize the impact upon the creek. The report indicates that each catchment to Hyland Creek must identify and acquire or protect the site for its community detention pond prior to development proceeding. If the developers acquire, or protect to the satisfaction of the City, the required community pond site, then they may use interim detention on their individual sites provided the facility meets all the City needs and requirements.

For Catchment Area 1, the report originally proposed that the community pond be located at 148 Street and 66 Avenue but it was relocated after discussions with the Steering Committee to a location immediately north of the City Works Yard. Approximately one year was spent while the Steering Committee tried to determine a location for a detention pond for this catchment area. At one point, the City offered to provide an acre of the Works Yard site, subject to Council's approval, if the developers could provide the additional land immediately to the north. Nothing was finalized but both sites are still possible options to be pursued by the developers.

For Catchment Area 3, the report proposed that a community pond be located in the area of 152 Street and 66A Avenue. Several pond sites were investigated within the Hyland Creek floodplain but these sites were not acceptable to the Department of Fisheries and Oceans. Developers in the area are currently investigating alternative locations.

The minor drainage system (5 year return storm) will be directed to a storm sewer system. The major flood path (100 year return storm) is accommodated by a combination of storm sewer and roadways.

All three catchment areas have a common problem. From a cash flow perspective, none of these areas have the ability to fund the solution to their drainage problems with DCCs as the works are all required before development can proceed. None of the catchment areas have a large enough application to fund the required works.

The City's 10 Year Servicing Plan includes an amount of \$3,090,000 for drainage works required for this NCP. The Stage 2 Report recommends that \$541,000 be added to the 10 Year Servicing Plan. The total drainage works required to be funded by Drainage DCCs is \$3,631,000 while the Drainage DCCs from the NCP total only \$2,816,000 leaving a shortfall of \$851,000. This matter is addressed further under Development Phasing.

## INFRASTRUCTURE FINANCING

### SUMMARY

The Stage 2 Report deals with the servicing requirements for the NCP that are to be provided within or immediately adjacent to the NCP. Generally the Report does not address the demands that the NCP may place on the Municipal systems outside of the NCP area. These overall demands are included in the 10 Year Servicing Plan and are funded by Development Cost Charges collected from development and not expended upon works within the NCP itself.

The total Development Cost Charges that will be paid by this Neighbourhood will be approximately \$15,418,000. The estimated DCC related expenses within the Neighbourhood are \$15,299,000.

Upon complete build-out, this NCP will have paid approximately \$119,000 more in DCCs than the costs of works required, within the NCP area, to service the NCP with Municipal services. A net position of the DCC account for each item of infrastructure is listed below. This surplus does not recognize all upgrading requirements beyond the boundaries of the NCP nor does it take into account works already provided to the benefit for the NCP by the City or other developments through their payment of DCCs. The following table summarizes these facts.

	Projected DCC Revenues	Current 10 Year Servicing Plan	Additions to Servicing Plan	Revised Servicing Plan	Net Surplus or Deficit
Sanitary	\$1,429,000	1,216,000	0	1,216,000	213,000
Drainage	\$2,816,000	3,090,000	541,000	3,631,000	(815,000)
Water	\$1,649,000	422,000	0	422,000	1,227,000
Major Collector	\$1,930,000	2,370,000	160,000	2,530,000	(600,000)
Arterial Roads	\$7,594,000	4,000,000	3,500,000	7,500,000	94,000
Total	\$15,418,000	\$11,098,000	\$4,201,000	\$15,299,000	\$119,000

With the exception of the improvements to the 71 Avenue ditch, the above table does not include the overall infrastructure works required to service the NCP that are external to the NCP.

## DEVELOPMENT PHASING

As mentioned earlier, this NCP has a financial problem with the drainage and major collector works required to service the area as the total value of these works exceeds the total DCCs to be paid for these categories by the NCP at build out.

Other than for the drainage works and the sanitary sewer lift station, there are no major DCC rebatable infrastructure works required to open up the NCP for development. It was proposed by the Stage 2 Report that the NCP development be phased by allowing one drainage area to develop at a time. Each subsequent area would have been assisted by the excess DCCs collected from the previously developed areas.

The Citizens Steering Committee has asked that the NCP not be phased by catchment area. They would prefer that each catchment area be allowed to proceed independent of the others. This means that each catchment area will be required to find a way to fund the solution to its own drainage problems possibly without assistance from the other catchment areas. It is likely that they would achieve this by a group of developers front ending the needed infrastructure and using a form of latecomer agreement to collect from the benefiting properties

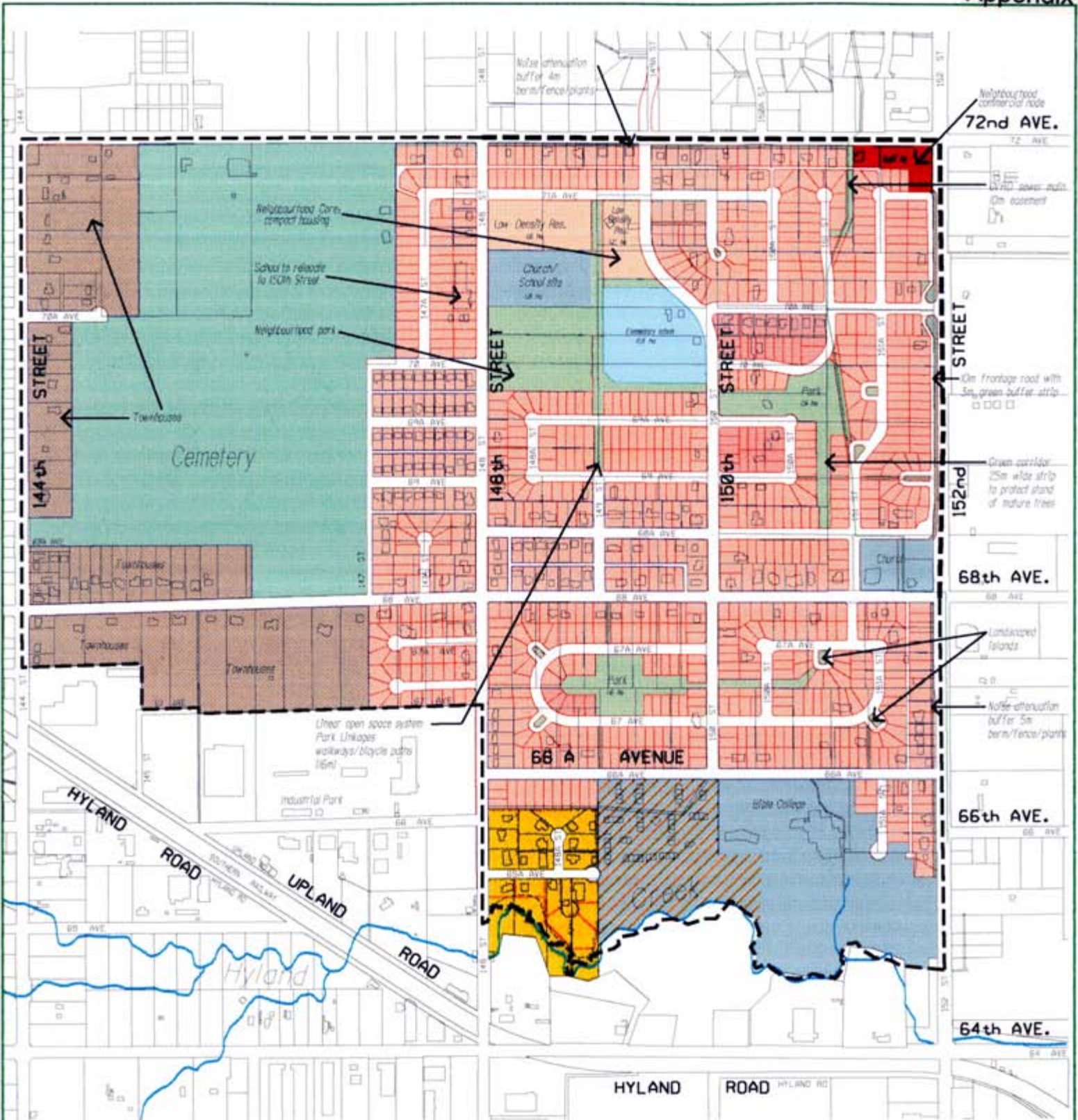
Catchment Areas 2 and 3 will generate sufficient Drainage DCC to pay for their drainage works. Catchment Area 1 requires \$2,265,000 of DCC rebatable drainage works but will be short about \$1,193,000 at build out. The excess Drainage DCCs from the other two catchment areas will be about \$377,000. It will be difficult for some parts of catchment area 1 to develop without additional DCCs being provided by the City when excess funds become available and when these drainage works become priority for the City. No time frame can be provided to the land owners in the area as to when these funds may become available.

The Engineering Department is prepared to support this proposed approach to opening up the NCP for development. This approach will be market driven with no specific phasing plan.

The proposed general phasing plan presented in the report attempts to minimize in a broad manner, the infrastructure costs to each development by suggesting that development should proceed logically from the lowest area of the catchment area and moving systematically up the slope. If landowners choose to proceed outside of the phasing proposed then they will have to construct infrastructure that would otherwise be built and paid for by other landowners.



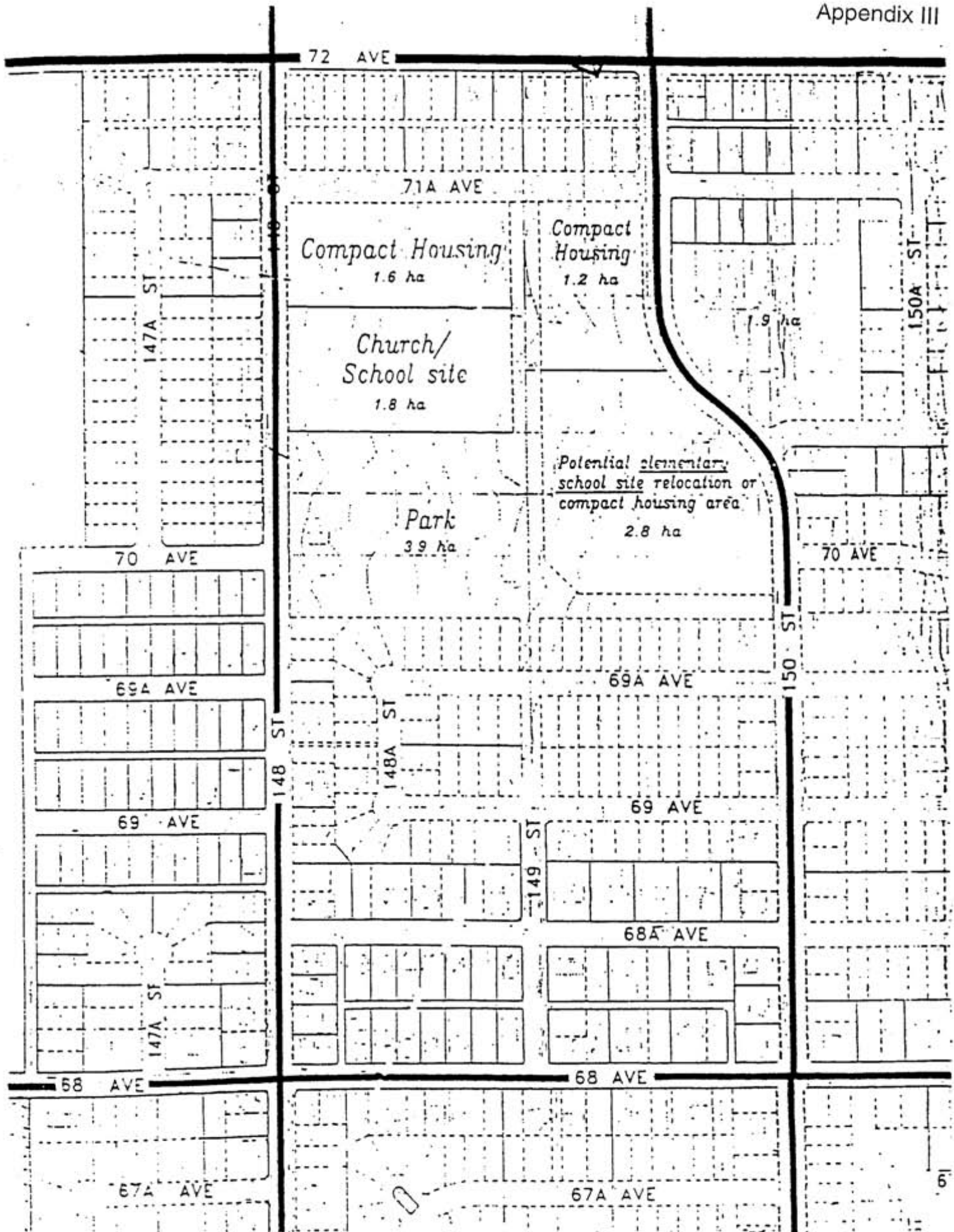
Umendra Mital, P.Eng.,  
General Manager, Engineering



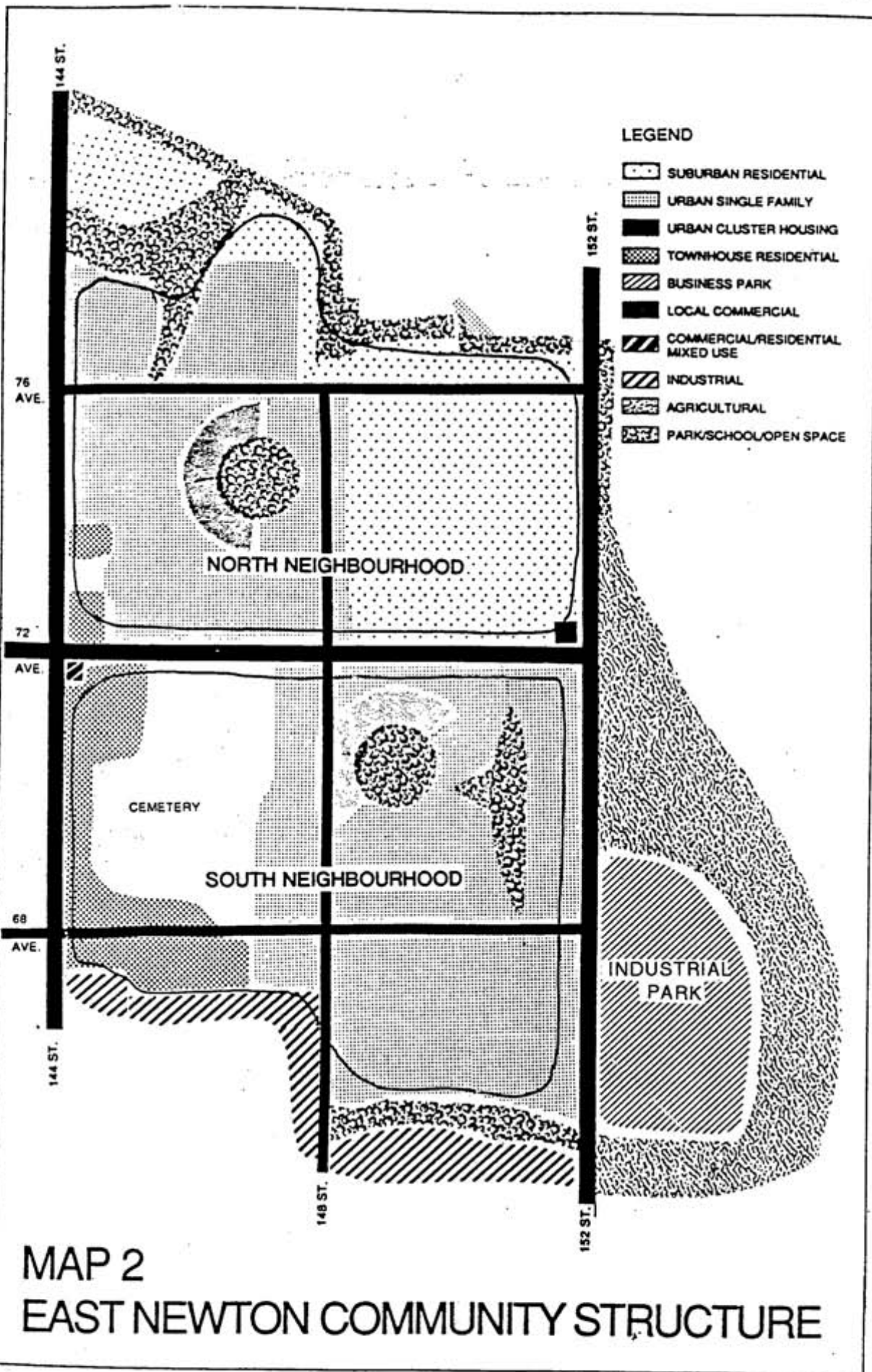
**NEIGHBOURHOOD CONCEPT PLAN  
East Newton, South Neighbourhood  
City of Surrey Planning & Development Department**

- |  |  |
|--|--|
| Half Acre Single Family Residential      | Institutional (Religious Assemblies, School) |
| Urban Single Family Residential          | Elementary School                            |
| Low Density Compact Housing (max. 10 up) | Cemetery                                     |
| Townhouses (max. 15 up)                  | Parks & Open Space                           |
| Neighbourhood / Local Commercial         | Landscaped Buffer Strips                     |
| Institutional / Townhouses               | NCP Boundary                                 |





ADJUSTMENT TO NEIGHBOURHOOD PARK LOCATION







2. To provide staff's analyses and recommendations on Stage 1 of the NCP;
3. To provide staff's analyses and recommendations on other alternative land use proposals put forward by individual property owners; and
4. To recommend approval in principle of Stage 1 of the NCP, in order to permit the NCP proponents to proceed with more detailed engineering and financial analyses (Stage 2).

## BACKGROUND

In March 1993 Council approved the East Newton Local Area Plan which formed the basis for guiding the general development of the area bounded to the west by 144 Street, to the north by the B.C. Hydro corridor and Guildford Golf Course south of 80 Avenue, to the east by the Agricultural Land Reserve boundary east of 152 Street, and to the south by the Industrial designated land north of 64 Avenue. A copy of the approved land use plan is attached (Appendix III). The Local Area Plan sets out general land use and development policies for the preparation of neighbourhood concept plans.

The Neighbourhood Concept Plan (NCP) approach to implementing local area plans was approved by Council in June 1993. Three NCP areas have been identified in East Newton, namely, the north neighbourhood (north of 72 Avenue), the south neighbourhood (south of 72 Avenue and west of 152 Street), and the business park (east of 152 Street) (Appendix IV).

## DISCUSSION

### NCP Preparation Process

#### 1. *NCP Initiation*

The NCP process for the south neighbourhood commenced in June 1994 with the consent of over 60% of the property owners.

#### 2. *Consultation with Property Owners and the Public*

There was extensive consultation with the property owners as well as the public throughout the NCP process.

A Steering Committee consisting of six property owners was formed in June 1994 to work closely with the NCP planning consultant, the City and other property owners on the preparation of the NCP. The Committee was further expanded to 11 members and 7 alternates in August 1995 in order to include a wider representation of owners in five sub-areas of the neighbourhood. The Committee has been meeting with the consultant and City staff on a regular basis to provide input during the NCP preparation process.

In addition, two public open houses were held in November 1994 and January 1996 respectively to receive public input and to assess consensus on various development

concepts proposed for the neighbourhood. Over 100 people attended each open house.

3. *Stage 1 and Consultation with the City of Surrey and Other Agencies*

City departments and outside agencies were consulted throughout the NCP preparation process. In February 1996, a draft Stage 1 Report on the land use component and general servicing concepts of the NCP was completed. Besides the Planning & Development Department, the report was circulated to the Engineering Department, Parks & Recreation Department, Fire Department, School District, B.C. Transit, and GVRD for review and comment. The attached Stage 1 document has incorporated the general comments and concerns identified in the consultation process. Outstanding items, as listed in Appendix II, will be addressed in Stage 2 of the NCP.

4. *Stage 2*

Subject to Council's approval of Stage 1, servicing details, development phasing, amenity requirements and financing plans will be developed in Stage 2 of the NCP. Another round of consultation with the Steering Committee, the public and referral agencies will be carried out before submission of the Stage 2 report to Council for consideration.

A general list of items to be addressed in Stage 2 is provided in Appendix II.

**Compliance with the East Newton Local Area Plan**

The proposed NCP is in general compliance with the policies and directions set out in the East Newton Local Area Plan (LAP), with the following exceptions:

1. *Local Commercial*

Two local commercial sites have been identified in the East Newton LAP (Appendix III). One of them is the existing garden centre located at the north-west corner of 72 Avenue and 152 Street. The garden centre may be expanded to include a wider range of uses to serve the local shopping needs of the area. The other site is a 1-acre property at the south-east corner of 72 Avenue and 144 Street which is designated for a commercial/medium density residential mixed-use development. The commercial component of this mixed-use development would provide a limited amount of retail and service uses to serve the community.

The NCP proposes to replace this commercial/medium density residential mixed-use development by townhouses. On the other hand, the local commercial facilities will be moved to the south-west corner of 72 Avenue and 152 Street, further away from the Newton Town Centre and opposite to the existing garden centre. To be developed in accordance with high standard design guidelines, this 1.5-acre village commercial centre is proposed to accommodate local retail and service uses and a gas station (subject to zoning approval). The proposed gas station has satisfied the locational criteria and policies of Council on gasoline service stations in the following manner:

- (a) It is located at the intersection of two arterial roads, namely, 72 Avenue and 152 Street;
- (b) There is no other gas station at this intersection;
- (c) It is situated in the neighbourhood commercial node of the residential area; and
- (d) It is located at the fringe of the neighbourhood, away from pedestrian-oriented areas.

## 2. *Density Transition towards the Agricultural Land Reserve*

To provide an appropriate density transition between the urban development west of 152 Street and the agricultural land east of the street, the LAP specifies for the area bounded by 72 Avenue, 152 Street, 68 Avenue and 150 Street development guidelines including:

- (a) Urban single family residential at a maximum density of 14.75 units per hectare (6 units per acre);
- (b) Gradation of densities from the south-west to the north-east, having relatively lower density or larger lots towards 152 Street and 72 Avenue;
- (c) Landscaping buffer of a minimum width of 20 metres to be provided along 152 Street to minimize visual and noise impact.

Instead of the landscaping buffer, the NCP proposes a frontage road of a width of 10 metres incorporating a green buffer strip along 152 Street. It is considered that this landscaped frontage road itself can provide an adequate interface and visual relief for the agricultural area east of 152 Street. Therefore, the density transition to distribute larger lots towards the junction of 72 Avenue and 152 Street is not required.

These deviations from the LAP were discussed at length and accepted by the Steering Committee. They were shown to the property owners and the public at the open houses. They were also reviewed by various referral agencies. There were no objections to the changes. However, an additional commercial site was requested to be considered in the NCP. This item is discussed below under the Alternative Land Use Proposals Section.

## NCP Stage 1 - An Overview

### Land Use Plan (Appendix I)

The NCP covers an area of approximately 178 hectares (440 acres), involving over 200 property owners. The land use plan component establishes the type, density, size and location of specific land uses including residential, commercial, institutional, and open space, road hierarchy and alignments, and subdivision concepts.

It is estimated that there will be 1,705 dwelling units, including 215 existing dwellings, accommodating a projected population of about 5,195 in the neighbourhood.

#### 1. Residential (86.3 ha. or 213.2 ac.)

In accordance with the LAP, the neighbourhood is predominantly single family residential. Its core is located between 148 Street and 150 Street south of 71A Avenue, comprising a 5.8-hectare joint school/park site which is surrounded by comprehensively designed, family-oriented low density compact housing at a maximum density of 10 units per acre.

Single family lots located along 152 Street will be buffered from the arterial road either by a 5-metre landscaped berm or a 10-metre frontage road. Those lots along 72 Avenue will be buffered by a 4-metre landscaped berm.

Medium density residential in the form of townhouses are proposed in the western part of the neighbourhood, fronting on 72 Avenue, 144 Street and 68 Avenue, where public transit is available or close-by.

A general area in the NCP has been considered for potential affordable housing project sites. Bounded by 144 Street, 72 Avenue, 150 Street and 67 Avenue, the area encompasses townhouse sites and low density compact housing sites (10 units per acre maximum) in close proximity of school and park facilities, public transit, and local retail and services. While affordable family housing projects are typically comprised of townhouse units, the townhouse sites at the south-east corner 72 Avenue and 144 Street seem to meet the location criteria for affordable housing.

In view of the school capacity situation which is described below and in compliance with the LAP, no provision for secondary suites has been made in this NCP area.

#### 2. Commercial (0.6 ha. or 1.5 ac.)

As mentioned above, the NCP proposes a 1.5-acre site at the south-west corner of 72 Avenue and 152 Street to provide local services and retail facilities for the residents. The provision of commercial facilities on a limited scale is considered adequate as they are intended to serve the day-to-day shopping needs of the neighbourhood, while community-scale commercial facilities are available at the Newton Town Centre about a mile away.

The proposed location is also considered appropriate as it responds to the desire of the residents to locate commercial facilities at the periphery of the neighbourhood, and away from the school area.

Moreover, the proposed commercial site, which may incorporate a gas station, will be developed in accordance with strict design control guidelines to ensure compatibility with the adjacent uses. The design guidelines are provided in Appendix C of the Stage 1 Report (Appendix I).

3. *Institutional (44.5 ha. or 110 ac.)*

There are a number of existing institutional uses in the NCP area, including the 38-hectare cemetery south of 72 Avenue and east of 144 Street, the Bible College with ancillary townhouses on 66A Avenue west of 152 Street, a Pentecostal Church property and the Princess Margaret School Annex on 68 Avenue west of 152 Street.

The NCP proposes relocation of the T.E. Scott Elementary School from its existing site on 148 Street south of 72 Avenue to a more central location in the neighbourhood. The new location which is on the west side 150 Street at 70 Avenue is preferable for the following reasons:

- (a) It fronts onto 150 Street which is a limited collector carrying local traffic as opposed to 148 Street which is a major collector carrying through traffic.
- (b) It is immediately adjacent to the neighbourhood park site, thus allowing unimpeded access between the two sites and joint use of the school and park facilities. The existing T.E. Scott School site is separated from the park site by 148 Street, with potential vehicular-pedestrian conflicts.
- (c) It is at a more central location to serve the neighbourhood.
- (d) The 5.8-hectare joint school and park site forms the focal point of the neighbourhood, in conformity with the LAP.

It should be noted that discussion is underway among the School District, the Parks & Recreation Department and the Archdiocese of Vancouver regarding possible land swaps as reflected on the Land Use Plan of the NCP. The Archdiocese owns the two properties identified for the neighbourhood park. A land exchange between the existing T.E. Scott School site and the Archdiocese's properties is proposed by the latter. If the land exchange is successful, then the School District will have another land swap with the City, i.e. exchanging the Archdiocese's site proposed for park development with the new school site which is to be acquired by the Parks & Recreation Department on behalf of the School District.

If the proposed land exchanges cannot come to a conclusion, there will be adjustment to the park location. While the Archdiocese properties will be developed for church and school uses, the neighbourhood park site will be located south of the Archdiocese land. The existing T.E. Scott School site will be designated for single family residential. (Refer to Appendix V.)

On the basis of the estimated number of housing units in the NCP area, the School District projects an elementary student population of about 530, which is 6% higher than the School Board's policy of an elementary school size of 500. While some of the multi-family residential sites may be developed for the adult-oriented market, the Archdiocese school site, when developed, has the potential to alleviate the situation.

Secondary school age students in this NCP would be served by Frank Hurt Secondary School at 77 Avenue/138 Street. There is severe overcrowding at Frank Hurt currently. Some relief to the overcrowding will, however, be provided when the new addition to the School is complete later this year. Further relief is anticipated with the completion of a new secondary school, Green Timbers Area Secondary School at 84 Avenue/144 Street. This school is now under construction and is expected to be completed in 1997 or 1998.

#### 4. *Open Space (7.7 ha. or 19.0 ac)*

In addition to the 3.0-hectare (7.4-acre) neighbourhood park site at 148 Street south of 71A Avenue planned for active recreation mentioned above, two smaller park sites have been identified in the NCP. To serve the area south of 68 Avenue, a local park of about 1.6 hectares (4.0 acres) is proposed at a central location between 67 Avenue and 67A Avenue west of 150 Street for children play and passive recreation. To preserve the existing stands of mature trees along the ridge west of 152 Street and to provide some passive open space, a 1.9-hectare (4.7-acre) park site has been designated between 150 Street and 151 Street south of 70 Avenue.

The three park sites are inter-connected and are made accessible from different parts of the neighbourhood by a linear open space system and walkways.

### **General Servicing Concepts**

The Engineering Department advises that the general servicing concepts (involving utilities, roads and transportation) outlined in the Stage 1 report (Appendix I) will support the proposed land uses. Details of the servicing strategy, solutions for utilities, drainage and transportation issues, and funding of services will be addressed in Stage 2 of the NCP. Engineering items to be addressed in Stage 2 are included in Appendix II.

The Engineering Department has projected a significant cash-flow shortfall in the Development Cost Charges Program if the 14 NCPs currently underway are allowed to proceed to development. It is, therefore, recommended that a comprehensive financial plan be required for each NCP and be prepared in accordance with Council's NCP policy of "Development Pays" as part of Stage 2.

## Alternative Land Use Proposals

A number of alternative land use proposals were put forward by individual property owners in the NCP area in the past three months; and were reviewed by the Steering Committee. The location of the proposals is highlighted in Appendix VI.

### 1. *Townhouse Development at 152 Street South of 66A Avenue*

It was proposed that a townhouse development be considered for the six properties at the south-west corner of 152 Street and 66A Avenue, because they are opposite to the proposed industrial park, bordering the busy road of 152 Street, and do not have the luxury of providing a landscaping buffer along 152 Street due to the limited size of the properties. Moreover, there are already townhouses on the south side of 66A Avenue on the Bible College site.

The proposal was reviewed by the Steering Committee at their meeting on January 4, 1996. The Committee did not support the proposal, and considered that the properties concerned should remain single family residential, as shown on the NCP land use plan and the East Newton Local Area Plan.

Staff Comments: A townhouse development at this location is not compatible with the single family lots on the north side of 66A Avenue. It is contrary to the approved LAP. It defeats the west to east density transition that both the LAP and the NCP are trying to achieve in the neighbourhood. Furthermore, an increase of residential density in the NCP cannot be supported in view of the saturation of the school capacity. The Planning & Development Department, therefore, recommends that this area remains as single family residential as proposed in the NCP.

### 2. *Alternative Road Layout for the Block Bounded by 66A Avenue, 148 Street, 68 Avenue and 150 Street*

In order to save a 27-year-old house, at 6693 - 150 Street, which is located at the proposed road right-of-way of 67 Avenue on the NCP land use plan, it was proposed to revise the road layout for the block bounded by 66A Avenue, 148 Street, 68 Avenue and 150 Street.

An alternative road layout was prepared. It was reviewed by the Steering Committee at their meeting on January 24, 1996. A major drawback of the alternative layout was that it resulted in less lot yield and more land for roads for the area. As such, the Committee decided that the road layout as shown on the NCP land use plan stayed the same.

Staff Comments: The property owners concerned are not required to demolish the existing house immediately. They may retain it for as long as they wish. Alternative access on a temporary basis which meets the requirements of the City may be considered for subdivision of other properties within the block. As the road layout as proposed in the NCP is more efficient, the Planning & Development Department recommends that it remains unchanged.

3. *Proposed Low Density Compact Housing (10 Units/Acre) East of 150 Street Realignment*

There were some concerns about the realignment of 150 Street which as it exists ends at 72 Avenue in an offset T-intersection. To improve the situation, the NCP proposes a realignment of 150 Street. Taking into consideration the grades and the ultimate width of 72 Avenue (i.e. 4 lanes plus a centre lane for left turn movements), the proposed realignment of 150 Street to tie in with 149A Street in the north will offer maximum accessibility for the neighbourhood and address safety concerns.

On the NCP land use plan, low density compact housing at a maximum density of 10 units per acre is proposed on the west side of 150 Street to form the neighbourhood core. The property owners of 7095 - 150 Street requested this type of housing be also considered on the east side of the street for their property. The request was discussed at the Steering Committee meeting on January 4, 1996 but was not supported.

Staff Comments: 150 Street clearly delineates the neighbourhood core to the west and the single family subdivisions to the east. The request will diffuse the neighbourhood core concept for the NCP. Moreover, in view of the saturation of the school capacity, an increase of residential density in this NCP is not supportable. Therefore, the Planning & Development Department recommends that the site remains as single family residential as proposed in the NCP.

4. *Proposed Child Care Centre and Neighbourhood Commercial at 72 Avenue/148 Street*

The northern portion of the property at 14822 - 72 Avenue, of a land area of about 2.5 acres, was proposed for a child care centre, community services and neighbourhood commercial uses.

The property is designated single family residential on the East Newton Local Area Plan and the NCP land use plan. It was suggested to change the land use to allow for the following uses:

- A child care centre of a maximum capacity of 50 spaces;
- A community hall for 500 people maximum;
- Other community services such as a drop-in centre for seniors;
- Restaurants;
- Grocery stores;
- Barbershops;
- Beauty parlours;
- Cleaning and repair of clothing;
- Video shops; and
- Medical and dental clinics.



Being the central point between the two elementary schools in East Newton, the site was considered to be ideal for a large child care centre and neighbourhood commercial. The proponent of this alternative commercial site also suggested that the location of the commercial facilities proposed on the NCP land use plan was not satisfactory as they were located on the busy streets of 72 Avenue and 152 Street, and that this was at odds with the linear open space and walkway/bicycle path system designed for pedestrians and cyclists in the neighbourhood.

The proposal was discussed at the Steering Committee meeting on January 24, 1996. The Committee did not have a resolution on whether the commercial component should be supported. It was generally felt that the proposed child care centre which complements the schools is acceptable.

Staff Comments: The Planning & Development Department does not support the proposed commercial uses at the south-east corner of 72 Avenue and 148 Street for the following reasons:

- (a) The proposed location of the commercial facilities on the NCP land use plan is intended to respond to the residents' desire to have commercial at the fringe of the neighbourhood and away from the school area.
- (b) Given that commercial facilities have already been provided for the area on 72 Avenue at 144 Street and 152 Street respectively, an additional commercial node at this location is not required.
- (c) There are concerns about the proximity of the proposed commercial development to the schools in the area.
- (d) There is no significant difference between the subject site and the commercial site at 72 Avenue/152 Street in terms of accessibility to residents in the NCP area.

However, uses which are complementary to the schools such as a child care centre are considered supportable by the Planning & Development Department. It is, therefore, recommended that the proposed child care centre be included in the review of the facility/amenity needs for the neighbourhood in Stage 2.

## CONCLUSION

The land use plan component (Stage 1) of the NCP is in general conformity with the East Newton Local Area Plan. The general servicing concepts put forward will support the proposed land uses, densities and subdivision concepts.

The planning process associated with this NCP meets the original objectives of the NCP program. The NCP represents a majority consensus among the property owners. It also involves extensive consultation with and incorporates the requirements of various City departments and other referral agencies.

The Planning & Development Department, therefore, recommends that Stage 1 of the NCP for the south neighbourhood of East Newton be approved in principle.

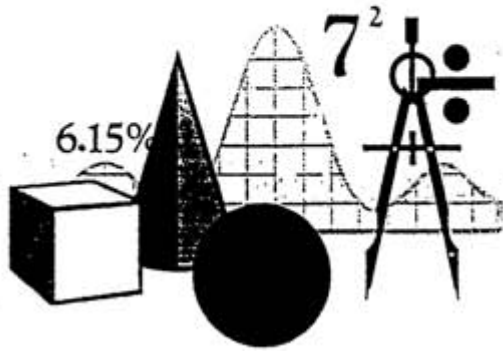


Lehman O. Walker  
General Manager  
Planning & Development Department

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Appendices:

- I East Newton (South) Neighbourhood Concept Plan Stage One Report - Land Use Plan
- II List of Items Required to be Addressed in Stage 2
- III East Newton Local Area Plan Land Use Plan
- IV East Newton Neighbourhood Concept Plan Boundaries
- V Adjustment to Neighbourhood Park Location
- VI Location of Alternative Land Use Proposals



**TOWARDS THE TIMELY AND ECONOMIC  
CONSTRUCTION  
OF NEW SCHOOL FACILITIES  
IN SURREY**

**Prepared by the  
Task Force on Funding New Schools**

**November 1997**

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<b>5. Task Force on Funding New Schools - Members</b>	Appendix A

## 1. EXECUTIVE SUMMARY

In February 1997 Surrey City Council passed a motion requesting that a Task Force be established to find ways to ensure that the construction of schools will meet the demands generated by growth and development in Surrey. The Task Force, comprised of representatives from the Province, City of Surrey, City of White Rock, Surrey and White Rock Chambers of Commerce, Surrey and White Rock School Districts, Surrey Teacher's Association, development industry, District 36 Parent Advisory Council, CUPE Local 728, parents, students, and citizens from the community at large, met regularly between May and October 1997.

This report addresses the issues affecting the construction and funding of new schools as identified by the Task Force, and presents recommendations and suggestions for further investigation. The Task Force has identified the following seven recommendations as priorities for change to be initiated by the fall of 1998. "Surrey" in the following recommendations, refers to the community as a whole, including all stakeholder groups concerned with the provision of education.

***Key Recommendation #1:***

*That Surrey seek from the Province an increase in capital funding for school construction in growth areas, and the establishment of an equitable and predictable funding process that is responsive to local priorities.*

***Key Recommendation #2:***

*That Surrey request the Province to devolve more authority for decisions to the School District around the use of capital funds to enable the School District to act upon local priorities.*

***Key Recommendation #3:***

*That the Province make necessary changes to legislation to allow for revenue generating strategies and joint ventures including public-private partnerships and public-public partnerships regarding school capital funding based on local policy decisions.*

***Key Recommendation #4:***

*That the Province take responsibility for ensuring the timely purchase of land for school sites based on local priorities.*

**Key Recommendation #5:**

*That the development application reports to the City be reviewed and revised in consultation with staff of the School District and the Planning and Development Department, to provide a more complete picture of the impact of development on school enrollment and capacity.*

**Key Recommendation #6:**

*That a cost-effective approach to school construction be maintained.*

**Key Recommendation #7:**

*That an Advisory Group be formed with representatives from all stakeholder groups to monitor implementation of the Task Force's recommendations.*

## 2. INTRODUCTION

The City of Surrey, because of its large supply of developable land, has been growing at a phenomenal rate and has one of the highest growth rates in Canada. Cutbacks in provincial capital funding, combined with funding inequities in the past have prevented School District #36 from constructing facilities to keep pace with the growth in student enrollment. The accumulated backlog from the deferrals over the years has exacerbated the shortfall.

School District #36 has not received site acquisition money in three years, and has indicated that a minimum of \$40 million is needed over the next five years to buy sites for 15 elementary schools and 1 secondary school to meet the growing student population. While thirteen school projects were approved for construction earlier this year, the School District has indicated that these were the priorities of 18 months ago, and will not sufficiently alleviate Surrey's overcrowded schools. Furthermore, the construction of many of these projects could be delayed up to eighteen months because the Province has requested that they be designed smaller and built cheaper.

While the Province is ultimately responsible for providing funding for schools, the Province, School District #36 and the City of Surrey have been working both individually and cooperatively on initiatives to accommodate growth in student enrollment within a limited budget. However, the government freeze on construction projects, which lasted from June 1996 to February 1997, has made it difficult to both catch up and keep up with enrollment increases. The School District has had to increasingly rely on portables to contain the overflow of students. Approximately 2000 new students enroll in the District each year, and there are about 7000 students attending classes in 335 portable classrooms. The number of portables is set to increase by nearly 40% next year, to 459. However, the School District has indicated that with the completion of three new elementary schools and additions to four other elementary schools by the end of 1998, the number of portables should be reduced to approximately 350. While portables are an acceptable method of managing short term population surges, they are not the most suitable solution to managing long term growth. Aside from creating an environment that is not conducive to learning, the ongoing additions of portables to schools reduce the size of playgrounds and open spaces and affect the optimal utilization of school sites.

In February 1997, in response to community concerns, Surrey City Council agreed to query stakeholder groups to see if there was interest in a task force to look at ways to build schools to meet the demands generated by growth and new residential development. Stakeholders were notified about the opportunity to participate through newspaper advertisements and invitations. Approximately 70 people responded, representing the Provincial government, City of Surrey, City of White Rock, Surrey and White Rock Chambers of Commerce, Surrey and White Rock School Districts, Surrey Teacher's Association, development industry, District 36 Parent Advisory Council, CUPE Local 728, parents, students, and citizens from the community at large. All interested parties were invited to participate on the Task Force, and the first meeting took place on May 1, 1997.

## 2.1 PROCESS UNDERTAKEN BY THE TASK FORCE

The Task Force, chaired by Peter Simpson, Chief Operating Officer of the Greater Vancouver Home Builder's Association, met biweekly from May to July 1997 to generate ideas, share information, identify issues, and propose alternative solutions. During the May and June meetings, Task Force members split into three small discussion groups to identify key issues and possible solutions. In July, the Task Force met as a whole to build consensus around the proposed solutions. Staff developed a draft report in August which was reviewed and finalized by the Task Force during September and October.

## 2.2 INITIATIVES BEING PURSUED BY THE PROVINCE, CITY, & SCHOOL DISTRICT

The Task Force was informed of the following cost-effective initiatives which are being pursued by the Province, City of Surrey, and School District #36 to accommodate enrollment growth within a limited budget:

- ***Joint acquisition of school/park sites***  
The City and the School District have coordinated the joint acquisition and development of school/park sites. In the past they have selected properties together, and the City has acquired, swapped and consolidated land on behalf of the School District. The City continues to purchase sites in strategic community locations which will be made available to the School District for joint use. However, the School District requires approval of the Province to negotiate the purchase of land for school purposes.
- ***Opportunity to comment on multi-family development applications***  
The Planning and Development Department notifies the School District upon receiving a development application in a school catchment area. The School District is requested to prepare any comments they wish to have included in the Planning report to Council.
- ***Representation from School District at Council and Parks and Recreation Commission meetings***  
A School Trustee and/or staff person attends Council and Surrey Parks and Recreation Commission meetings to provide additional background information.
- ***Approved school construction projects***  
The Province approved several school projects for construction earlier this year. However the School District has indicated that these were the priorities 18 months ago, and will not sufficiently alleviate Surrey's overcrowded schools.



- *Sites designated for schools in NCP areas*  
Steps have been taken through the Neighbourhood Concept Plan (NCP) process to decrease the costs of site acquisition by designating land for school sites in NCP areas before development occurs.
- *Common design plans and design competitions*  
The School District has approved five schools to be designed under the concept of common design plans, and these should be completed by December 1998. The School District used design competitions and provincial input to develop the common plans.
- *Decreased cost of school construction*  
The School District will build smaller schools with fewer frills over the next few years, cutting back mainly on architectural features and alternative building materials.
- *Efficient use of school facilities*  
The School District is taking measures to use schools efficiently and accommodate more students within existing structures. For example:
  - ◆ The School District reviews all school sites for consideration of selling lands surplus to the educational needs of the District.
  - ◆ In June 1997 the School Board implemented a new enrollment policy to reduce or eliminate under-utilized space within the School District. There should be no schools with empty spaces this fall due to changes in policy.
  - ◆ Four schools will have extended days, which will allow 18% - 25% more students to attend classes without having to acquire more classroom space.
  - ◆ The School District is pursuing the necessary capital funding to operate a pilot project which will enable students to take two blocks of classes "on-line" from home. This will enable more students to be accommodated in existing classrooms.

### 3. FINDINGS OF THE TASK FORCE

The findings of the Task Force have been split into two parts: Key Recommendations and Additional Suggestions. The Key Recommendations are comprised of solutions which are supported by a majority of Task Force members. The Additional Suggestions, while no less valid, are comprised of solutions which are supported by a smaller number of members.

#### 3.1 KEY RECOMMENDATIONS

***Key Recommendation #1:***

*That Surrey seek from the Province an increase in capital funding for school construction in growth areas, and the establishment of an equitable and predictable funding process that is responsive to local priorities.*

***Issue:***

The provincial funding and allocation process for new school construction is complex, lacks certainty and predictability, has not addressed the needs of high growth areas, and has not permitted the development of facilities to keep pace with growth in student enrollment. Funding that is predictable and responsive to community needs would recognize the uniqueness of fast growth areas, and permit the development of facilities to keep pace with growth in student enrollment in an efficient and cost-effective manner. This could be accomplished through the establishment of a multi-year framework for budgeting and a one-time capital grant to remedy the backlog that has developed as a result of insufficient funding in the past.

***Key Recommendation #2:***

*That Surrey request the Province to devolve more authority for decisions to the School District around the use of capital funds to enable the School District to act upon local priorities.*

***Issue:***

The Province controls all capital funding decisions for schools in British Columbia. While the competing needs of many school districts need to be considered, local priorities are not necessarily acted upon when funds are distributed. The funding process could be more responsive to local priorities if School District #36 had the authority to decide how to spend the money which it is allocated for site acquisition and school construction. Local level decision making could also reduce paperwork, result in more timely construction, and a more efficient and cost-effective process.

***Key Recommendation #3:***

*That the Province make necessary changes to legislation to allow for revenue generating strategies and joint ventures including public-private partnerships and public-public partnerships regarding school capital funding based on local policy decisions.*

***Issue:***

Fiscal realities have made it necessary to identify alternative funding methods to supplement limited capital funding and provide the timely delivery of essential school facilities. Partnerships, whether private, public, or non-profit, encourage a creative approach to development using the combined strengths and skills of all sectors involved. Partnerships could allow greater efficiencies to be achieved by maximizing the abilities and skills of each partner, reducing project costs through effective project techniques, and providing flexible financing options and new sources of revenue.

In terms of school construction, a public-private partnership may bring in private investors to design, build, and finance a school, which is then leased to the School District. A public-public partnership may call for the development of a multi-purpose facility which integrates a school, library, sports arena, theatre, and public health office. Partnerships need to be carefully evaluated, as each situation requires a different solution, depending on variables such as availability of capital, staff resources, cash flow patterns, safety concerns, labour agreements, and operational issues.

There are a variety of revenue generating strategies, such as fee-for-service community use, leased space to community organizations, sponsorships, donations, and school foundations which could be used where appropriate to enhance the capital budget. The establishment of school construction bonds is another type of revenue generating strategy, although this idea is not supported by all Task Force members.

***Key Recommendation #4:***

*That the Province take responsibility for ensuring the timely purchase of land for school sites based on local priorities.*

***Issue:***

Proactive site acquisition could allow School District #36 to move ahead of the market demand for land and purchase sites in a timely and economical manner. Sites could be "banked" and leased for interim use until needed for school construction. Sites could also be acquired from the private sector through density transfers, density bonuses, and land dedications. School sites could be acquired along with park sites to make acquisition more timely and cost effective when required.

***Key Recommendation #5:***

*That the development application reports to the City be reviewed and revised in consultation with staff of the School District and the Planning and Development Department, to provide a more complete picture of the impact of development on school enrollment and capacity.*

***Issue:***

Currently, School District #36 provides the Surrey Planning and Development Department with comments on the effects of *individual* developments on school catchment areas for multi-family and single family development proposals of ten or more units. Planning reports could be made more comprehensive if the following information was included:

- existing school enrollment
- capacity of the school in the catchment area
- impact of development on school
- a timeline of projected demand and school enrollment
- cumulative impacts of proposed and recent developments in the area on school enrollment and capacity

Such information would facilitate a more complete assessment of the cumulative impact of development proposals on school enrollment and facilities, and would provide Council with the information necessary to make more informed decisions on development proposals.

***Key Recommendation #6:***

*That a cost-effective approach to school construction be maintained.*

***Issue:***

A number of strategies are being undertaken by School District #36 to reduce the cost of school construction by utilizing and encouraging innovative, cost-effective designs. For example, schools are being built with common plans solicited through design competitions, low maintenance materials, fewer frills, and fewer architectural features. Modular schools are an option to consider for the timely delivery of schools, even though they may not be less expensive to build.

***Key Recommendation #7:***

*That an Advisory Group be formed with representatives from all stakeholder groups to monitor implementation of the Task Force's recommendations.*

***Issue:***

The Task Force will dissolve in November, before there is opportunity for the recommendations to be implemented. Members feel strongly that an Advisory Group, comprised of representatives from each of the stakeholder groups on the Task Force, be developed to take ownership of the report and monitor the implementation of the recommendations. Volunteers members of the Task Force have agreed to organize the Advisory Group and develop terms of reference.

### **3.2 ADDITIONAL SUGGESTIONS**

The following suggestions are comprised of solutions that are supported by less than a majority of members. These concepts require further review and consultation before implementation can be more fully supported.

***1. Utilize existing schools more efficiently and decrease dependence on portables.***

Approaches such as year-round schooling, extended days, satellite classrooms and virtual schools have been identified as methods of using existing schools more efficiently to ease overcrowding, reduce the dependence on portables, and accommodate more students within existing structures. According to School District #36, the provision of extended days is now a prerequisite to receiving future capital funds.

***2. Rationalize individual site size requirements.***

Effective use of land may reduce the size of the site required, and reduce the cost of site acquisition. This can be accomplished by increasing the height of schools, sharing facilities, combining playing fields with park sites, and locating schools in close proximity to recreational centres so that their respective facilities can be shared. Some Task Force members feel strongly that current school site requirements should be reduced. However, this, as well as most siting decisions, require assessment on a case-by case basis.

#### 4. CONCLUSION

The City of Surrey has one of the highest growth rates in Canada. Cutbacks in provincial capital funding, combined with funding inequities in the past have prevented School District #36 from constructing facilities to keep pace with the growth in student enrollment. This report outlines seven Key Recommendations developed by the Task Force on Funding New Schools to facilitate the timely and economic construction of new school facilities.

The Task Force will dissolve in November, and Surrey City Council, School District #36, and the community will continue their joint efforts to ensure funding for the acquisition of school sites and construction of schools for public education.

## 5. TASK FORCE ON FUNDING NEW SCHOOLS - MEMBERS

1. Andy Aadmi, A&A Construction Ltd.
2. Wayne Baldwin, City of White Rock
3. Donna Bradley, Surrey Resident
4. Yolanda Breck, Parent Advisory Council
5. Tom Buckham, Ministry of Education
6. Gordon Cameron, Canlan Investment
7. Mike Christ, Devcorp Consulting
8. Barb Crone, Surrey Resident
9. Michael Courtenay, Cascadia Land
10. Diana Delver, Surrey Teachers' Assoc.
11. Jeanne Eddington, Councillor
12. Peter Ellis, Surrey Teachers' Assoc.
13. David Erickson, David Erickson Consulting Ltd.
14. Diane Gillis, Surrey Resident
15. K.C. Gilroy, Office of Penny Priddy
16. Pam Glass, White Rock Chamber of Commerce
17. Claudia Guichon, Parent Advisory Council
18. Raghbir Gurm, Bridgewater Consulting
19. Sue Hammell, MLA
20. Beth Hardy, Office of Sue Hammell
21. Morris Harowitz, MHM Group
22. Larry Huber, Parent Advisory Council
23. Wayne Jefferson, Surrey School District
24. Brian Jeffrey, Parent Advisory Council
25. Avtar Johl, Johl Development
26. Steven Johnson, Surrey Resident
27. Trish Kelley, Surrey Teachers' Assoc.
28. Bill Kruger, CitiWest Consulting
29. Lynne Kubara, Parent Advisory Council
30. Barry Lepin, Surrey Teachers' Assoc.
31. Philip Levine, IBI Group
32. Pam Lewin, Councillor
33. Amanda List, Surrey Chamber of Commerce
34. Robbie MacDougall, Parent Advisory Council
35. Patricia Mangat, SFU Student
36. Chuck Marr, Genstar Development
37. Judy McKague, Parent Advisory Council
38. Bonnie McKinnon, MLA
39. Laurae McNally, School Trustee
40. Shawn Mitton, Workers Compensation Board
41. Riccardo Nardelli, Narland
42. Caron Nightingale, Surrey Resident
43. Gino Nonni, Parklane
44. Chuck Osborne, CUPE Local 728
45. Harjinder Parwana, Surrey Resident
46. Barbara Paton, Surrey Resident
47. Mary Polak, School Trustee
48. Kim Proctor, Parent Advisory Council
49. Douglas Regelous, Intracorp Developments Ltd.
50. Dianne Rinke, Parent Advisory Council
51. Tanya Rowlands, Surrey Resident
52. Gaetan Royer, Parks and Recreation
53. Greg Sewell, Coastland Engineering and Surveying
54. Kelly Shields, Surrey Teachers' Assoc.
55. Peter Simpson, Greater Vancouver Home Builders Association
56. John Steil, Stanley Associates
57. Richard Stewart, Parklane Ventures
58. Lee Tan, Consultant
59. Adrian Telford, Parent Advisory Council
60. John Turner, Progressive Consulting
61. Gary Tymoschuk, School Trustee
62. Marten Van Huizen, Field & Marten Associates Inc.
63. Oleg Verbenkov, Aplin & Martin Consultants Inc.
64. Judy Villeneuve, Councillor
65. Jackie Ward, Parent Advisory Council
66. Dianne Watts, Councillor
67. John Wyndham, Surrey Teachers' Association
68. Susan Zander, CUPE Local 728

## **Appendix B**

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### **General Design Guidelines for Townhouse and Low Rise Housing Areas**

**East Newton (South) N.C.P.**



B. COMPACT HOUSING AREAS (RM-10 ZONES), AND TOWNHOUSE AREA (RM-15 ZONE)

General Design Guidelines - RM 10 and RM 15

These guidelines are intended to promote the orderly urban development, and help to define the overall character of this area.

It is recommended that East Newton (South) Neighbourhood, be developed as a residential area that is safe, pedestrian oriented, and incorporates natural characteristics of the land while responding to the overall objectives of the East Newton Local Area Plan.

**General Guidelines**

**Site Layout and Circulation. (CPTED)**

- Site plan design should be based on the principles of defensible space which attempt to strengthen territoriality and natural surveillance. The creation of a perceptible edge of the proposed development and channeling of pedestrian movement to predetermined well surveyed points within the complex is recommended.
- A hierarchy of increasingly private zones which define a transition from the public street to semi-private areas and further to private dwellings should be clearly defined within the project.
- Outdoor areas should be divided into visually identifiable zones to encourage adjacent residents to adopt proprietary attitudes toward those spaces. This is particularly important in children play areas. Buildings should be sited to encourage the creation of well-defined outdoor common areas, such as courts and plazas. Efficient and convenient connection between indoor and outdoor recreational/amenity is encouraged.
- Buildings should relate to contours and natural site features. Site layout, building setbacks, unit's design, should respond to the specific site conditions. It should consider, views, slopes, noise, natural amenities, adjacent open spaces, and try to maximize units with southern exposure.
- Visitor parking within the project should be clearly identifiable by the use of decorative pavers or contrasting paving materials. It is recommended that visitor parking areas be broken down into small number of parking spaces and integrated into landscaped areas.
- To reinforce the residential character of the neighborhood, it is recommended that pedestrians oriented lights be provided along internal streets, and should not interfere with the privacy of adjacent residential units.
- Contrasting paving, including color and material, should be used to define the continuity of main pedestrian/bike paths across interior streets or driveways and to reinforce the overall dominance of pedestrians over vehicles. Pedestrian crossings at intersections should also be treated this way.
- The sidewalk pavement should be continuous across the access driveway to garage of a residential unit and should be distinct from the driveway's pavement. This is specially

important in driveways of units that have access from public streets. Units having abutting garages should share one curb let down (driveway access point).

#### Streetscape Character.

Areas of the project fronting public streets should reinforce the overall identity and character of the Neighborhood. The following recommendations focus on the quality of the streetscape to consolidate its residential character.

- Townhouse units fronting on a single family area across a public street should have a single family character and front onto the street. This character may be achieved by having no more than two units linked in a row and by the treatment of the street frontage in a similar fashion than the units in the SF neighborhood. Private outdoor living areas (outdoor extensions to main habitable rooms) should not be planned toward the street.
- Unless warranted by special character of the street, the number of units linked in a row should not be more than four. In the case of units fronting on a single family residential area across the street the maximum number in a row should be two, and should be designed in a way that resemble a SF house, i.e., symmetrical units are discouraged.
- Yards along public streets should be treated and landscaped similar to front yards of single family residences to achieve integration of the project to the dominant character of the area.
- Landscaped areas along public streets should be continuous, complementary, and help to define a unity of streetscape. Yards abutting any public street should be treated as front yards in a single family residential zone (no fences or low fences with a maximum height of 4 ft.).
- To maintain uniformity and continuity of landscaped front yard areas, fences between sites should not extend beyond the line of the required front set-back. Shrubs and hedges are suggested on the yards abutting a public street to achieve the desired level of privacy on these areas.

#### Buildings Form and Character:

The design of buildings should achieve architectural harmony, lend visual integration to already built areas, and should not disrupt the overall character of the neighborhood.

- The design of a new project, or the addition to an existing one, should be based on a comprehensive design concept that is compatible with, and reinforces the character of the area and surrounding urban context. It is recommended to create a consistent architectural vocabulary for the area, i.e., coordinated use of dormers, pitched roofs, verandahs, siding, porches, etc.
- To achieve a visual diversity within the project, variations in building height, separations, roof lines and set-backs are suggested. Focal points should be developed at on-site intersections
- Design and alignment of internal driveways should avoid a streetscape dominated by garages, should add visual interest to the project and avoid the "corridor" effect. Garages' doors facing garage doors across a driveway should be avoided.

- The volume of an attached garage should not be the single dominant element of the townhouse units (1/2 of the length of the garage is recommended to be included within the unit main volume).
- Where townhouse units front on and have vehicular access from a public street, not more than 60% of the unit frontage area should be devoted to driveway for the garage. Individual access driveways are not encouraged. Shared driveways should not be wider than 18 feet to minimize interruptions of the landscaped boulevard.
- When the garage is contained within the unit building envelope, it is recommended that not more than 60% of the unit frontage be occupied by garage doors. The creation of attractive entrances, a more lively environment within the complex and meaningful landscaped areas between units is encouraged, i.e., use of balconies, and windows toward roads and/or interior lanes is recommended.

#### Common Open Spaces, Play Areas and Landscaping:

- Central open spaces should provide opportunities for the resident's public gatherings while also defining a landmark at the entrance to the project and along pedestrian paths.
- Within a townhouse project, clear definition of entry zones, common driveways, private parking, sidewalks and access driveway into garages are encouraged. Use of pavers, special surface treatment or other attractive and durable material is desirable in these areas.
- All areas not covered by buildings, structures, parking, circulation, including set-back areas, should be fully landscaped with due consideration and reinforcement of the existing land form or features of the site. Proposed landscaping should include native tree species of adequate size. (25% of the total number of proposed trees is suggested).
- Standard Communal Canada Post mail box units should be integrated into a building or transit stop that forms part of the project. If a self standing structure is to house the mail boxes, it should also offer weather protection for the users and be built with materials of a quality equivalent to the rest of the buildings. Plain independent self-standing mail boxes are not acceptable.
- Areas for storage of large items (i.e., recreational vehicles) and appurtenances such as satellite dishes should be screened from view from neighbors and public streets. Use of landscaped berms, hedges and evergreens are recommended. Landscaping should also be used to screen utility equipment boxes.
- All outdoor refuse storage areas should be covered and enclosed to improve the overall visual quality of the project and to reduce the nuisance of pests, animals and odors. Use of evergreens is recommended to screen refuse storage and collection areas, and utility equipment.
- Picket fences and three board fences, which are associated with the character of a small town are recommended for use in defining semi-public areas and children play areas.
- Play areas for children should be considered within the project. Play areas should be strategically located (preferable in the proximity of the indoor recreation room) and away from major roads.

## Tree Preservation

- Prior to any development undertaking on a site, a tree survey shall be completed by a qualified arborist for the entire project site. This survey shall highlight current tree stands, and identify those trees to be maintained at development completion, to be identified as "Trees to be Preserved" on the Tree Location Plan. The Developer shall provide the purchaser of each strata lot, in the event that the project is developed under the Strata Title Act, with a copy of the Tree Location Plan.
- No building shall be constructed on the Lands which would require the removal of any trees identified to be preserved on the Tree Location Plan.
- No tree identified on the Tree Location Plan shall be cut down or removed without first obtaining a written recommendation by an 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.
- The preserved trees on the Lands shall be maintained in accordance with reasonable arborist's practice.
- Any perimeter fencing shall be appropriately screened with landscaping. Perimeter fencing must be screened for at least 50% of its length by landscaping such as trees and shrubs.
- All major landscape areas shall be provided with an underground irrigation system in order to enhance the overall project.
- Any site waste disposal bins shall be completely landscaped and screened within an enclosure no less than 2 metres in height.

## **Appendix C**

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### **Design Guidelines for Village Commercial Area**

**- to apply to all Commercial designated lands -**

## SECTION C DESIGN GUIDELINES FOR COMMERCIAL AREAS

### OBJECTIVE OF COMMERCIAL AREA GUIDELINES

The purpose of these guidelines is to achieve a high quality of commercial development

#### 1.0 *Design Guidelines*

##### *Building Siting*

- Buildings should, where feasible, be sited with one wall on the side property line to permit the linking of buildings in the adjacent site to achieve greater continuity. Where a building on the adjoining lot is already sited on the side property line, new development should join such existing building to form a continuous facade, with coordinated design and treatment of building, fronting sidewalk and weather protection wherever applicable and possible.
- Where the adjoining properties contain incompatible uses, the minimum setback requirements stipulated in the Zoning By-law should not be relaxed. Dense and tall landscape buffer should be provided. This landscape buffer should occupy at least 50% of the required setback.
- All buildings, structures and expansions or additions thereto, should be architecturally coordinated and should be planned in a comprehensive manner, giving consideration to the relationship between buildings and open areas, efficiency of the circulation system, visual impact, and design compatibility with the surrounding areas.

##### *Building and Parking Finish*

- Any "free wall" of an end building which is visible from the street should be finished to the same standard as the front of the building, and where it faces a side street, it should contain substantial fenestration or be finished to provide an attractive appearance.
- The design of the parking area should be attractive and efficient. Coordination of parking lots with adjacent properties with reciprocal access agreements to ensure street efficiency, is encouraged. Rear loading is also encouraged.
- For roof treatment, sloped, gabled and tiled roof treatment is recommended.. Where both a service station and retail stores occupy the same site, coordinated roofing between store and canopy is desirable, with roof design to be of a nature which does not conflict with the overall residential character of this area.

### *Landscaping, Signage, Screening, and Pedestrian Linkages*

- At the corner of 152 Street and 72 Avenue, an opportunity exists for gateway landscaping. Feature landscaping at this corner shall be integrated with any commercial use on the site. Substantial landscaping to screen the parking lots from the streets and interplanting of the parking area with trees is required.
- A clear, direct and pleasing pathway system, preferably with different paving and landscaping treatment, should be provided to connect the buildings with transit stops, parking lots and the sidewalks in the abutting streets, wherever appropriate.
- Landscaping, awnings, lighting fixtures, street furniture and other structures, should be architecturally integrated with the design of the main buildings.
- The size, height, location, and design of free standing signs should be architecturally integrated into the overall design of the buildings and landscaping. Low mount, monument style signage is preferred. Free standing signs shall be surrounded by landscaping and decorative treatment.
- The location, size and design of fascia signs containing individual business signage should be integrated into the design of the building. Freestanding signs with a height in excess of 3m are prohibited.
- All portions of the site not covered by buildings, structures or parking shall be landscaped.
- Surface parking lots whether at ground level or on a structure, shall be screened from the public view by good quality fencing or landscaping or a combination of both. Any parking area in front of the building should be screened by landscaping only.

## Development Permit Area Guidelines

### Common Guidelines:

The following Common Guidelines apply to all commercial and multiple residential developments, to all Comprehensive Development Zones allowing commercial or multiple residential uses, to business parks and to all developments as defined within industrial designated areas. These guidelines are supplemented by Specific Guidelines B through F.

#### **A. All Commercial, Multiple Residential and Applicable Industrial and Comprehensive Developments**

##### **A.1 Access, Circulation and Parking**

- A.1.1** Consider joint or shared access between adjacent developments. Continuation of driving aisles and pedestrian sidewalks or walkways between adjacent sites is encouraged. Consider shared access between adjacent underground parking structures, especially in commercial developments. In the case of a duplex dwelling unit, a shared driveway access is required.
- A.1.2** Divide large<sup>1</sup> surface parking areas into smaller sections defined by a building or curbed landscaping strips at least 1.5 metres (5 feet) in width and containing trees, shrubs and ground covering plants. In order to facilitate pedestrian connection between the smaller parking sections and protect landscaping, consider providing paved pathways (about 1 metre [3 feet] wide) at strategic intervals across the width of the landscaping strip.
- A.1.3** Locate and design curb-cuts or curb let-downs to accommodate wheelchair/scooter movement and to provide convenient access to building(s) from the parking space(s) for the disabled. Ensure areas for pedestrian movement are designed to avoid any obstruction by parked vehicles.
- A.1.4** Where applicable, consider providing parking spaces or compounds for recreational vehicles. Locate such areas away from any public street and provide landscaping to screen them, unless they are located within a parking structure.

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<sup>1</sup> A large parking area equals a parking area containing more than 50 parking spaces.



- A.1.5** In commercial and industrial developments having large surface parking areas, provide a direct and functional pedestrian pathway system through the parking area in order to provide convenient pedestrian access between building entrances and parked cars and sidewalks of the abutting streets. Features such as distinct paving, special landscaping with trees and benches, and overhead weather protection for the pathway should be incorporated. It should be wide enough to accommodate wheelchairs/scooters used by disabled persons and designed with consideration for use by visually impaired persons.
- A.1.6** Design all or a portion of surface parking lots along prominent streets and which are particularly large in area (e.g. in shopping centres), to double as car storage and as outdoor activity spaces, such as outdoor markets, plazas, play areas and seating areas. These spaces should be defined by such features as distinct paving, landscaping, and sheltered areas. Other features such as visual art, water features, display space and lighting to add visual interest and activity to such spaces are encouraged.
- A.1.7** Design the pedestrian access points of underground parking to visually integrate with the interior lighting, finishes and activity areas of a building. For example, providing transparent glazing around elevator and stair lobbies, extending use of some of the interior finishes and design details of the main floor to underground lobbies and locating some of the pedestrian-oriented uses and activities (e.g. dry cleaner and newspaper shop of a commercial development) at the underground parking level.

## **A.2 Parking Lot Landscaping**

- A.2.1** Provide landscaping, including deciduous and coniferous trees, between and at the end of rows of parking, and within and at the periphery of surface parking lots in order to visually break up and partially screen parking from public streets or neighbouring properties. Landscaping should also be used to define parking clusters, highlight pedestrian routes, increase human comfort, provide visual relief, and interrupt paved surfaces to increase natural drainage.
- A.2.2** Trees within parking areas should be of a type and height so that the crown of the tree extends above the height of standard, prevalent types of vehicles that do not require clearance lights.
- A.2.3** In addition to the landscaping and trees required at the periphery of surface parking areas, provide landscaping and shade trees (6 centimeters [2.5 inches] caliper trees are preferred) within parking areas. Consider the following:

- a) Provide shade trees and landscaping at the ends of each parking rank (i.e. a group of parking spaces separated by driving aisles) within a landscaping strip located along the side of parking spaces. At least one shade tree is required at the ends of a single row of parking spaces and two shade trees are required at the ends of two adjoining rows (front to front) of parking spaces.
- b) Provide one landscaping strip containing at least one shade tree along the side of a parking space at the end of every 6 spaces in a single row, or two shade trees along the end of each group of 6 paired spaces (i.e. 12 spaces in two adjoining rows of 6 spaces each front to front); or  
Provide a landscaping strip at least 3.6 metres (12 feet) in length and containing at least one shade tree between adjoining rows for each group of 6 paired spaces. Small car spaces may be paired and the difference in length between small car and regular car spaces may be used to provide the landscaping strip.
- c) In any event, a distance of about 20 metres (66 feet) should be maintained between trees within a parking lot.
- d) Each landscaping strip should be curbed and at least 1.5 metres (5 feet) in width. It should contain a combination of shrubs and ground covering plants in addition to shade trees.

The above noted guidelines are provided for general guidance. Alternative schemes for landscaping and tree planting within parking lots may only be considered either in order to accommodate a pedestrian pathway system through a parking area, or if warranted by site specific constraints which must be clearly identified and justified.

**A.2.4** Consider reducing the amount of asphalt paving in large parking areas by introducing variation in paving materials (e.g. concrete, decorative pavers and a continuous, shallow concrete gutter or swale with rolled edges to separate parking spaces from driving aisles).

**A.2.5** Design and landscape any surface parking area (including roof top parking) likely to be visible from surrounding tall buildings, structures, SkyTrain, bridges or upland areas so as to reduce its visual impact. Consider introducing distinct paving surfaces, geometric patterns, trees, landscaped planters and trellises to improve the visual image of the parking area.

**A.2.6** In the case of a surface parking lot for a non-farm use located on Agricultural designated land, provide a minimum 7.5 metres (24.6 feet) wide landscaped buffer consisting of landscaping and fencing along the perimeter of the parking lot which abuts the agricultural land.

### **A.3 Parking Lot Safety and Security**

- A.3.1** Ensure convenient, safe and identifiable access routes for all people (including the disabled) to building entrances, lobbies or other principal areas of buildings, and to grade level from any underground or above ground parking structures.
- A.3.2** Avoid locating employee parking in remote areas of parking lots, behind blank walls or within service or loading areas.
- A.3.3** Design the interior spaces and exits from any underground or above ground parking structures for maximum visibility within the parking area. Avoid hidden spaces or alcoves.
- A.3.4** Provide lighting for surface parking lots and in underground and above ground parking structures. Lighting along pedestrian pathways should be at a scale appropriate for pedestrians. Lighting should be located and designed to ensure that all areas are well lit. Maximize and use all opportunities for natural lighting in underground or multi-level above ground parking structures. Walls and ceilings of parking structures, especially underground structures, should be painted white to enhance or reflect light.
- A.3.5** In underground and multi-level above ground parking structures, provide transparent glazing and windows to the elevator and stair lobbies. In order to provide some activity and human presence at the parking level, consider locating such spaces as workshops with windows to the parking area in residential buildings, or retail shops in the case of commercial buildings.
- A.3.6** Design the underground and above ground parking structures to provide easily identifiable access points such as lobbies, stairs and elevators. Use colour schemes, graphics and signs to assist in identification of different areas and levels of the parking structure.
- A.3.7** Consider using electronic security devices and monitoring systems to supplement design considerations in order to increase the level of surveillance and safety in parking areas.

### **A.4 Bicycle Parking and Storage**

- A.4.1** Provide bicycle parking facilities at grade close to building entrances and secure bicycle storage areas within buildings. If the bicycle storage area is provided as part of a parking structure, it should be located close to elevators.

## **A.5 Site Safety and Security**

- A.5.1** Locate and design developments to provide maximum opportunity for surveillance of the interior and exterior spaces from buildings, adjacent streets, walkways or any outdoor areas (including surface parking). Consider the following:
- a) Design main entrances to be prominent, visible and clearly recognizable.
  - b) Design the entrance levels of buildings to allow maximum viewing into or from lobbies through the placement, size and type of glazing used in windows and doors to assist in casual surveillance.
  - c) Organize and design buildings and landscaping areas to allow maximum overlook of adjacent streets, open spaces, parking areas and entrances by building users and residents.
  - d) Illuminate buildings and outdoor spaces to improve visibility. Lighting should be durable, avoid causing glare, and located so as not to impact on privacy within the development and on the adjoining properties.
- A.5.2** Use the design and siting of buildings, outdoor spaces and landscaping to define areas for private use and public use, especially for areas abutting streets. Define such areas by landscaping and architectural features (such as low walls, bollards and raised planters) rather than by continuous and solid fences or walls. Maintain opportunities for casual surveillance from the street.
- A.5.3** Design access to entrances to be free of barriers and obstructions.

## **A.6 Landscaping and Fences**

- A.6.1** Maximize the amount of landscaped areas on site and minimize the amount of impervious paved surfaces to increase the natural absorption of storm water.
- A.6.2** Subdivide land, when applicable, and design and locate buildings and outdoor spaces (such as golf courses) to avoid excessive disruption of the natural topography of the site. Retain creeks and ravines in their natural state and use natural landscaping to retain slopes on the site. Integrate buildings and structures with the natural slopes and other significant features.
- A.6.3** Identify, preserve and incorporate stands of mature trees into the overall site landscaping design. Retain unique tree species, significant vegetation and nesting areas on the site.
- A.6.4** At least 30% of the plant material should be indigenous species in order to increase the survival rate of the proposed vegetation after planting and assist in the rejuvenation of any existing plant material that may be preserved.

- A.6.5** Limit the use of grassed surfaces to highly visible areas or those used by many people for recreation so as to maximize areas for native, diverse and low maintenance plant material.
- A.6.6** Select vegetation and trees that will be readily established and provide significant visual impact upon planting, and that will not adversely affect daylight or sunlight penetration to buildings and open spaces when fully grown. Extensive use of single species should be avoided. A variety of sizes and types of the plant material should be planted as noted below:
- a) Coniferous trees
    - 40% 3 metres (10 feet) high
    - 40% 3.5 metres (11.5 feet) high
    - 20% 4 metres (13 feet) high
  - b) Deciduous trees
    - 40% 5 cm. (2 inches) caliper
    - 40% 6 cm. (2.5 inches) caliper
    - 20% 8 cm. (3 inches) caliper
  - c) Shrubs should consist of a relatively even mix of No. 1, 2 and 5 pots.
- A.6.7** Maintain continuous landscaping along abutting streets and minimize the number of interruptions such as driveways and parking entrances. Continue the sidewalk pavement across driveways and parking entrances.
- A.6.8** Provide trees along the perimeter of a site, and on walkways and streets abutting the site.
- A.6.9** Take into consideration energy efficiency and conservation in the design of landscaped areas and in the selection of plant material (e.g. use species that conserve water, and design landscaping to moderate the effect of wind, to provide shade in summer to reduce energy required for cooling, to allow sunlight and daylight to buildings and to reduce the extent of paved surfaces to allow natural drainage).
- A.6.10** Avoid using fences along property lines that abut streets to screen the development. When a fence is unavoidable, a transparent fence (e.g. full lattice, wrought iron fence etc.) should be used. Transparent fences combined with landscaping (such as hedge or shrubs) at the back and abutting the fence can be provided at the property line.
- A.6.11** A fence with a combination of transparent and solid sections or a solid fence may be used, provided that the fence is set back by at least 1 metre (3 feet) from the property line with landscaping on the street side. Alternatively, for added visual interest, consider setting back intermittent portions of the fence by 1 metre (3 feet) and provide landscaping within the inset portions, provided that portions of the fence located at the property line are transparent.

## **A.8 Refuse, Recycling and Service Areas**

- A.8.1** Consider providing space for a recycling, and/or a composting facility to generate materials that can be used to maintain the landscaping or allow for garden plots on the site.
- A.8.2** Locate common areas for the storage and collection of refuse and recycling material for those developments with multiple buildings or dwelling units. Ensure that the common areas are well situated and readily accessible from most buildings or units on the site. Avoid direct exposure to public streets and permit adequate maneuvering space for refuse removal vehicles.
- A.8.3** Locate and screen refuse/ recycling areas, shipping, loading or utility areas, satellite dishes and other similar structures, outdoor vents and mechanical equipment or transformers out of view from streets to improve the visual quality of the development. The design of the enclosure of refuse/recycling areas and screening of other areas should be coordinated with the overall design of the development. It should be built and finished to the same quality as the principal building and should have gates and a roof. Consider providing evergreen hedging or other similar landscape material to screen the enclosed areas.
- A.8.4** Consider enclosing or screening of refuse/recycling, shipping, loading or utility areas subject to overlook from nearby tall buildings with visually interesting roof surface treatment or architectural elements and roof forms (e.g. sloped roofs and skylights).

## **A.9 Form and Character of Buildings**

- A.9.1** Consider compatibility of the building design with the surrounding physical environment or land use and the character, scale and form of other buildings on the same site and on neighbouring sites. The compatibility of such features as roof lines, height, building mass, form, architectural character and outdoor spaces should be considered.

- A.9.2** On corner sites, locate the principal building at the corner. Design and shape the buildings with consideration for their visual prominence and potential for use as reference points or landmarks.
- A.9.3** Consider orienting features such as active interior spaces, main lobbies, principal entrances, entrance plazas and windows or glazing towards the corner.
- A.9.4** In commercial buildings, avoid extensive use of solid walls, reflective glass or other similar material on the ground floor facade facing a street that may impede visual connection of the building interior from the street. Use building mass or facade variation, textured surfaces, architectural detailing or graphics and colours to reduce visual impact of any solid wall.
- A.9.5** When buildings cannot be located at the corner, provide a landscaped area containing special features at the corner appropriate to the context (e.g. flag poles, ornamental trees, seating area, "decorative" paving or other similar features).
- A.9.6** Consider providing a transition between adjoining properties containing uses of different intensity (e.g. single family next to multi-family residential) or different types (e.g. residential next to commercial) through such design measures as building mass and height variation, landscaping buffer and additional setback from the property line.
- A.9.7** Orient and design buildings to reduce shadow impact on outdoor spaces and to encourage the penetration of sunlight and natural light into interior spaces so as to reduce energy needed for lighting and heating.
- A.9.8** In the case of multiple building and mixed use developments, consider using alternative technologies for on-site energy production (photo voltaic and fuel cells, heat pump, etc.) and waste reduction (hydroponic sewage treatment plant), provided that they meet the provincial and federal codes and the City's By-law or requirements.
- A.9.9** Consider providing weather protection over building entrances as part of the overall design.
- A.9.10** Enclose all exterior mechanical units or equipment, including roof top units and equipment with enclosures as part of the overall design.
- A.9.11** For developments next to a SkyTrain station or guideway and with overlook potential from SkyTrain, nearby taller buildings, structures or any residential area:
- a) Apply Guidelines A.9.1 to A.9.10 where appropriate.
  - b) Consider providing a physical linkage to the SkyTrain station, and include considerations for the provision of pedestrian oriented uses, amenities and features such as coffee shops, visual art, drinking fountains and washrooms. Bicycle facilities and storage lockers should also be considered. When the linkage is outdoors, provide amenities such as weather protection, lighting and street furniture.

- c) Design buildings and developments to include measures for reducing impact of noise from SkyTrain operations and road traffic based on a noise impact study, if required by the City. Also, include measures to ensure privacy from the potential overlook in developments located close to the SkyTrain guideway, especially in residential or mixed use developments.
- d) Pay attention to rooftop design so as to reduce the amount of roof area covered by flat roofs. Consider providing a visually interesting roof surface treatment (e.g. pavers and patterned or coloured gravel) or architectural elements and roof forms (e.g. sloped roofs and skylights).
- e) Organize and design buildings to avoid or minimize outdoor storage areas. Screen, enclose and/or cover such areas and provide landscaping to avoid their view from the SkyTrain, nearby buildings or any upland residential area.

**A.9.12** For gas station developments:

- a) For gas stations in residential areas at local commercial nodes or in a Neighbourhood Centre:

Gas stations should be smaller and custom-designed. They should have fewer pump islands (e.g. maximum 2 islands, each containing 2 pumps), greater setbacks for buildings from adjoining sites, canopies which are smaller and lower, elements that reflect the predominantly residential context (e.g. sloped roofs), lower lighting intensity, abundant perimeter landscaping, identifiable pedestrian access through the site and smaller signs.

- b) For gas stations in or adjacent to Town Centres and City Centre:

Gas stations should be designed in keeping with the overall design objectives for the area. Building designs should be compatible with other commercial developments and should include considerations for visual image from high density/high rise buildings and structures nearby. In some situations, e.g. at prominent corner sites, prototype building designs should be avoided. Landscaping, signage and pavement treatment should be reflective of the need to create a high quality, pedestrian friendly environment.



- c) For gas stations in highway commercial nodes or at isolated locations on arterial roads and provincial highways:

Designs should be coordinated with the adjacent highway oriented commercial developments. Prototype designs may be considered at these locations, except that the design should be modified for sites at highly visible locations, such as on a site that is within the entrance area of a town centre or a community, or is part of a comprehensively designed shopping centre or mixed use development. Gas stations in these locations may be larger and may have more pump islands, lighting and signage than those in town centres, City Centre, residential areas and neighbourhood centres.

- d) On corner sites, provide only one access into the site from each of the two abutting roads to minimize disruption of the sidewalk and landscaping continuity along the streets. Continue the sidewalk pavement across driveways to the site. Consider providing design features and pedestrian amenities at the corner such as a seating area in the City Centre and Town Centres, an open air shelter structure and seasonal landscaping.
- e) Provide landscaping amounting to at least 5% of the site area in gas station developments located in the City Centre or in Town Centres. Most of the landscaped area should abut adjoining streets and any adjoining residential site. Design the landscaping to define the edges of the sites, minimize view of the vehicular area from the streets and adjoining sites, and provide year-round visual interest.
- f) Landscaping should consist of trees and shrubs, including a low hedge. Low raised planters, low walls or low berms (e.g. up to 0.460 metre [1.5 feet] high) may form part of the landscaping to define edges of the site along streets.
- Consider providing hard surface pavement other than asphalt in areas next to streets to reduce the visual impact of the asphalt pavement.
- g) Locate and design buildings and overhead canopies with consideration for the visually prominent sites that gas stations normally occupy. Layouts and designs that relate buildings to streets and reduce the visual impact of vehicular areas when viewed from streets will be encouraged (e.g. by locating buildings close to streets and vehicular area away from streets). Avoid designing a single, large overhead canopy structure to cover several pump islands. Smaller canopy structures are preferred.
- h) Enclose all exterior mechanical units or equipment, including roof top units and equipment with enclosures as part of the overall design.
- i) Where gas station sites are likely to be viewed from the nearby taller buildings, particularly in the City Centre and in Town Centres, the overhead canopies and buildings should also be designed for viewing from above (e.g. consider design features such as sloped roofs and skylights and reduce the extent of flat roofs).

**A.9.13** In the case of a shopping centre or mall development:

- a) When large scale buildings are located next to the abutting streets, consider designing tenant spaces to be accessible from both an interior corridor and directly from the exterior of the building. Design the building to provide street orientation and pedestrian interest. Consider integrating any bus stops or transit shelters into the building design. Reduce the visual impact of the surrounding parking areas by locating and designing smaller scale buildings oriented to the street.
- b) Encourage locating buildings, structures or plazas at corners of major streets to avoid visual impact of parking and vehicular circulation areas at these locations.
- c) Comprehensively design all buildings, structures and open spaces with considerations for architectural coordination, compatibility with the surrounding environment, the need to reduce visual impact of parking lots and blank walls, and the creation of open spaces that are useful and supportive of outdoor pedestrian activities rather than left-over spaces between buildings.
- d) In the City Centre and Town Centres maintain the continuity of the built environment and street orientation. Locate and design pedestrian oriented buildings along the abutting streets and any surface parking away from the streets, behind buildings or in parking structures.

## A.11 Signs

- A.11.1** Integrate signs into the building design. Free-standing signs should be provided with bases preferably using the same material as is used for the principal building. These signs should be architecturally co-ordinated with the overall design and integrated into landscaped areas. "Three dimensional" signs designed to become an architectural feature or a landmark are encouraged rather than billboard type, pole mounted "flat" signs.
- A.11.2** In multiple-tenant commercial or industrial buildings, design signs to present a unified appearance. Make provision of signage space for tenants who may occupy area above the ground floor in multi storey buildings. Such signage, if located above the ground floor, should be restrained in size and should not obscure architectural features or detract from the overall building design.
- A.11.3** In commercial and industrial developments, avoid back-lit acrylic or plastic "box" type signs unless they are integrated into the overall building design. Avoid locating an illuminated sign next to residential sites.
- A.11.4** Provide signs to indicate street address and/or name of the development, with design consideration for visibility and legibility of the sign from the fronting street, and provide lighting for night time visibility of the sign.

## A.12 Other Provisions

- A.12.1** Where applicable, ensure that the subdivision of a site will maintain, provide or enhance safe and convenient pedestrian and bicycle connections to adjoining streets, bus routes and public spaces.
- A.12.2** In assembling and consolidating land for a development, ensure that the remaining adjacent land can be developed independently, or make provision in the design to extend development to the adjacent sites as a future phase.

## **C. Multiple Residential Development**

### **C.1 Access, Circulation and Parking**

**C.1.1** Design the internal road system to provide efficient circulation for vehicles such as garbage, delivery and fire trucks, discourage vehicles from speeding and allow space for pedestrian movement, landscaping and tree planting along the road.

**C.1.2** When visitors parking (including parking for the disabled) is underground, provide identifiable pedestrian access (other than by a parking ramp) from the visitors parking to grade close to the building entrance or directly into the building.

**C.1.3** In the case of duplex dwelling units:

- a) A shared driveway is required when the duplex dwelling is located on a lot other than a corner lot. In order to minimize the disruption of the boulevard landscaping and sidewalk continuity, the driveway should be no more than 3.65 metres (12 feet) wide within 3 metres (10 feet) from the property line.
- b) When the vehicular access can be obtained from a lane, the driveway should be provided from the lane.
- c) In the case of a duplex dwelling on a corner lot, separate driveways (each maximum 18 metres [59 feet] wide) to the two units within the duplex should be provided from the abutting streets.
- d) Parking space for vehicles outside the garage or carport in area other than the driveway should not be provided within the site.

### **C.2 Sites in or Next to An Environmentally Sensitive Area (ESA)**

**C.2.1** If a site is to be developed with both ground and non-ground oriented multiple residential buildings, then the ground oriented housing such as townhouses, should be sited away from portions of a site abutting a high or medium Environmentally Sensitive Area (ESA) area to avoid any adverse impacts on the ESA (e.g. from activities such as barbecuing on ground level outdoor patios or children playing). Unless specified in an environmental impact study approved by the City, preference should be given to siting non-ground oriented housing, such as apartment buildings, on those portions of a site that abut the ESA.

### C.3 Site Landscaping, Fences and Open Spaces

- C.3.1** Consider using pavement other than asphalt for areas such as crosswalks, sidewalks, common parking areas, driveways to individual units and entrance driveways to visually define them and reduce visual impact of asphalt pavement.
- C.3.2** Provide and design areas for outdoor recreation and other common use with consideration for the passive and active recreation needs of residents likely to live in the development.
- C.3.3** Provide secured and landscaped play areas for children. The size and design of the play area should consider the needs of residents likely to live in the development (e.g. in an adult or seniors oriented development where visitors may bring children with them, the play area can be small and may contain limited play equipment). The play areas should be located where children can be easily observed from nearby buildings. Design these areas to allow for a variety of play experiences, including a paved area for surface play. Consider the provision of a sheltered area or an indoor area for play and supervision during bad weather.
- C.3.4** Where a fence is desired to provide privacy from streets, consider restricting its use to the ground level patios or outdoor spaces of individual units rather than providing a single continuous fence along the property line. Any fencing should be provided in combination with provision of landscaping on the street side. Provide pedestrian connections from the street sidewalk through the fence to units along the street.
- C.3.5** Design the main entrance to a site to be identifiable and to provide visibility of the site interior from the street. Architecturally coordinate the entrance design with the overall design. Provide weather protection for the entrance and for such features as entry phones, site or building directories, or space for newspapers drop-off.
- C.3.6** In the case of duplex dwelling units, areas not covered by driveway, pathway or outdoor patio/deck should be landscaped. In any yard that abuts a street, provide a minimum 1.5 metres (5 feet) wide landscaping strip along the property line next to the street. It should contain shrubs and both coniferous and deciduous trees.
- C.3.7** In the case of a manufactured home park, a continuous landscaping strip minimum 7.5 metres (24.6 feet) wide should be provided along property lines that abut streets. When the site adjoins a similar development, this can be reduced to 4.6 metres (15 feet) along the property line abutting the adjoining site. The landscaping strip should consist a combination of low berms, both coniferous and deciduous trees and shrubs. A pathway system (maximum 2 metres [6.5 feet] wide) for the use of residents may be provided within the landscaped strip.

## C.4 Form and Character of Buildings

- C.4.1 Design buildings to front abutting streets, or design them so that the main entrance is accessed from and fronts the street that is used for the building address. Main entrances to individual units that abut a street (including townhouse units or ground floor units of apartment buildings) should face the street. Provide a direct and paved pedestrian pathway from the sidewalk to each of these units. Avoid orienting garages or carports of individual units to face the street.
- C.4.2 Locate and design units abutting a street to create a visually interesting streetscape (e.g. by varying the design, setbacks or roof lines of individual units).
- C.4.3 Design individual townhouse or apartment units to reflect their location on site (e.g. design treatment on corner units and features such as windows or balconies should be carried around the corner).
- C.4.4 Where ground oriented units (such as townhouses) have attached garages or carports, design the units to create attractive entrance spaces and provide visibility and direct pedestrian access to the entrance door. Garages or carports should not project by more than 50% of their depth from the face of the unit.
- C.4.5 Consider locating and designing units so that a view of interior streets is not dominated by garages or carports.
- C.4.6 Incorporate measures to shield and mitigate noise generated from road traffic in buildings and developments that abut or are near arterial roads.
- C.4.7 In the case of duplex dwelling units:
- a) Living area and kitchen for each of the two units within the duplex dwelling should be located on the ground floor.
  - b) Design the duplex dwelling to avoid "mirror" image and the appearance of a large, single house. Each unit contained in the duplex should be designed to be identifiable through design features such as distinctive design of the roof and design of the portion fronting the street. Give attention to designing and detailing of the front doors and windows to give each unit an identity. Ensure that the design features do not detract from the overall design.
  - c) Reduce visual impact of the duplex dwelling. Consider setting back all or a portion of the upper floor, especially along the sides of the dwelling. Give preference to using sloped gables rather than vertical, straight gables at the roof-ends.
  - d) Each duplex dwelling design should give consideration to compatibility of the design features such as windows, front entrances, shape of the roof and building materials or finishes with those prevalent in other dwelling units located on the same street.
  - e) When the duplex dwelling is located on a corner lot, the two units within the duplex should be located and designed so that the front entrance of each unit faces a different street.
  - f) The length of any facade without design variation should not exceed the width of one of the units.

## **E. Commercial Developments Not in the City Centre or Town Centres**

### **E.1 Parking**

- E.1.1** For development in a Neighbourhood Centre, consider providing access to off-street parking from the rear or side of the property to avoid conflict with pedestrian activities along the fronting street and to allow for a street oriented development. Where this is not possible, a shared access with the adjoining site or a single access into the site from the fronting street should be encouraged.
- E.1.2** In the case of a redevelopment of existing buildings that have the potential to be part of a Neighbourhood Centre, redesign or relocate the existing surface parking to reduce its visual and traffic impacts, and to create pedestrian spaces, increase landscaping and allow street oriented buildings to be located on the site.
- E.1.3** In the case of above ground parking structures, design the portion of the structure that face a street or public space as a commercial frontage (e.g. retail shops or offices) at least at the ground floor level. The remaining structure should be designed to minimize visual impact of parked cars from streets.
- E.1.4** In the case of golf-course developments, locate parking and service areas at a minimum distance of 30 metres (98.5 feet) from the property line abutting a street and 10 metres (33 feet) from the edge of a public pathway (pathway also includes bikeways).

### **E.3 Form and Character of Buildings**

#### **E.3.1** For developments in a Neighbourhood Centre:

- a) Consider providing a pedestrian space, such as a plaza and courtyard, within the development or along the building frontage. Co-ordinate the design of buildings and outdoor pedestrian spaces with those on neighbouring sites.
- b) Locate buildings at the minimum setback. Design them to provide pedestrian interest and weather protection along the building frontage and other building faces fronting on to an outdoor pedestrian space. Features such as visual art, water features, seating area and landscaping should form part of such pedestrian spaces.
- c) Maintain or provide a continuous grade between sidewalks along abutting streets and any outdoor public area along the building frontage and at building entrances. Ensure that the entrances to individual uses and spaces, such as shops, face the street and/or an outdoor public area, such as a plaza.
- d) Consider providing an outdoor space to permit a use or activity taking place in that portion of the ground floor which faces a street or pedestrian space to be extended outdoors (e.g. an eating area for a restaurant) without obstructing pedestrian flow.
- e) Avoid blank walls facing a street or outdoor pedestrian spaces. At the ground level, include windows and glazing of the type that would allow a visual connection to the interior space from outside.

## 6.2 EAST NEWTON GATEWAY FEATURE

Guidelines for development design are incorporated in the Stage 1, Land Use Report. One aspect to be considered in the overall quality of the area, is the concept of a gateway feature to mark the entrance into the East Newton area. The Local Area Plan suggested that some form of gateway feature be considered for the corner of 72nd Avenue and 144th Street. This area (the southeast corner) is proposed as a multiple family area, featuring townhouse density residential development. Costs of developing this gateway feature are expected to be borne by townhouse developers in the immediate area.

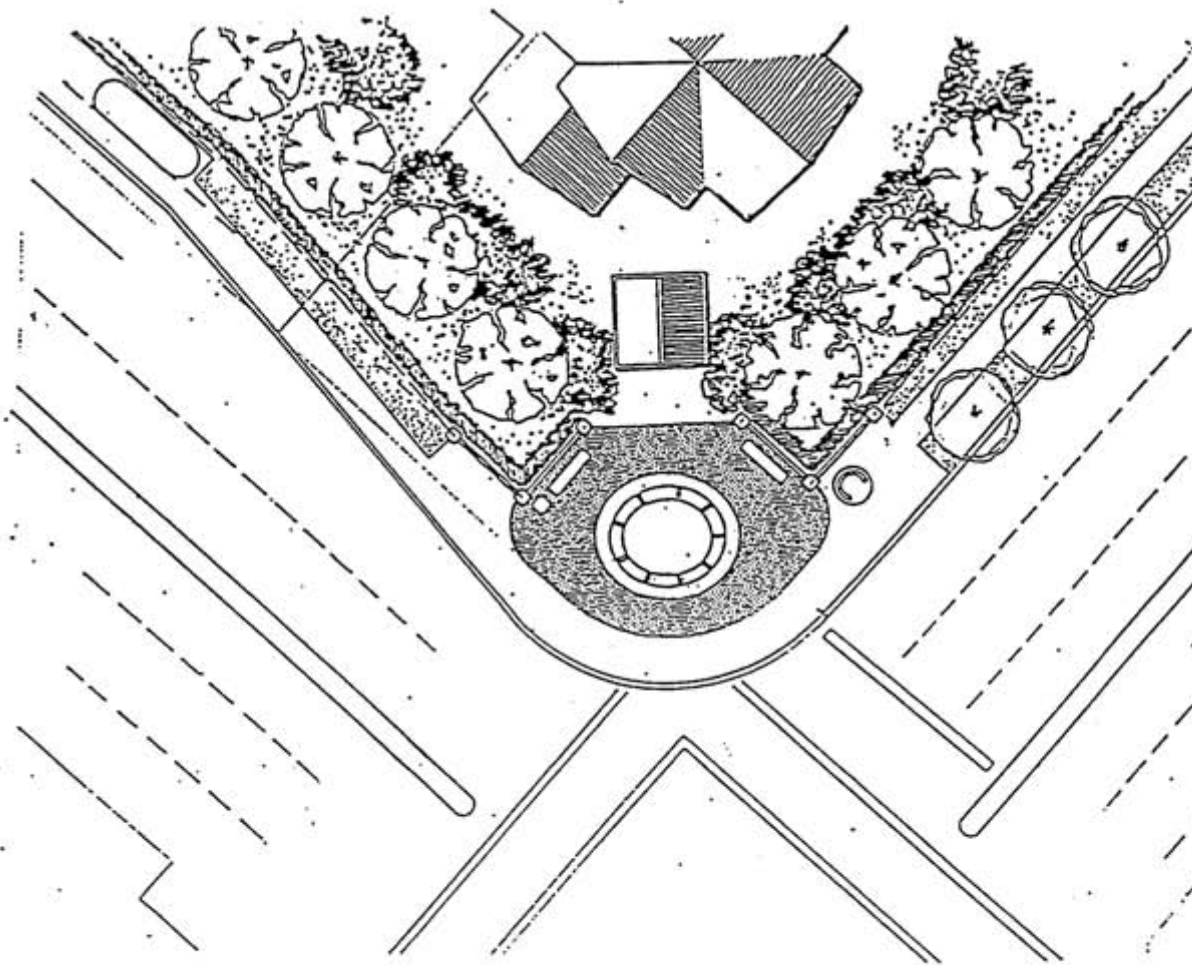
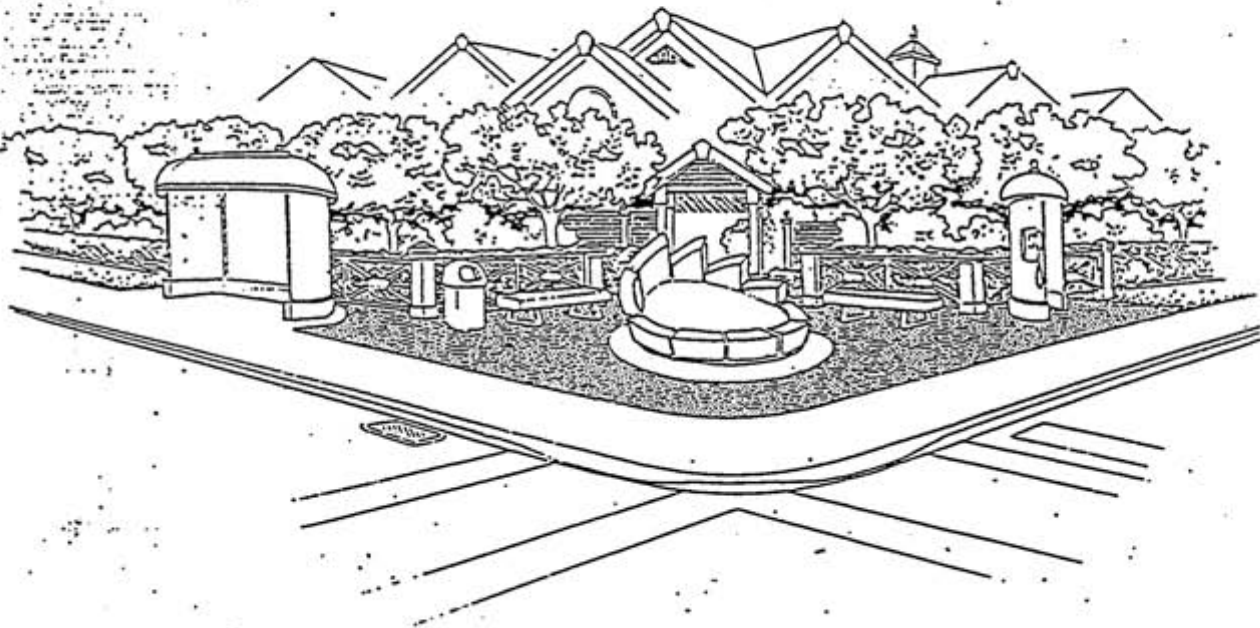
To provide some guidance to objectives for an entrance feature in this area, the following overall principles are proposed:

- Creation of an identifiable element through architectural/landscape features which provide an interesting streetscape element which can be carried through as part of the sidewalk treatment on 144th Street, as well as on 72nd Avenue.
- The amenity feature is intended to complement townhouses, which will be developed at the rear of the feature.
- Human scale elements are proposed to be introduced, through incorporation of a bus stop, a sign/poster kiosk, ornamental pavement, and a small seating area surrounding an architectural feature.
- If feasible, decorative tree species that can be replicated as boulevard trees along 72nd Avenue and along 144th Street.

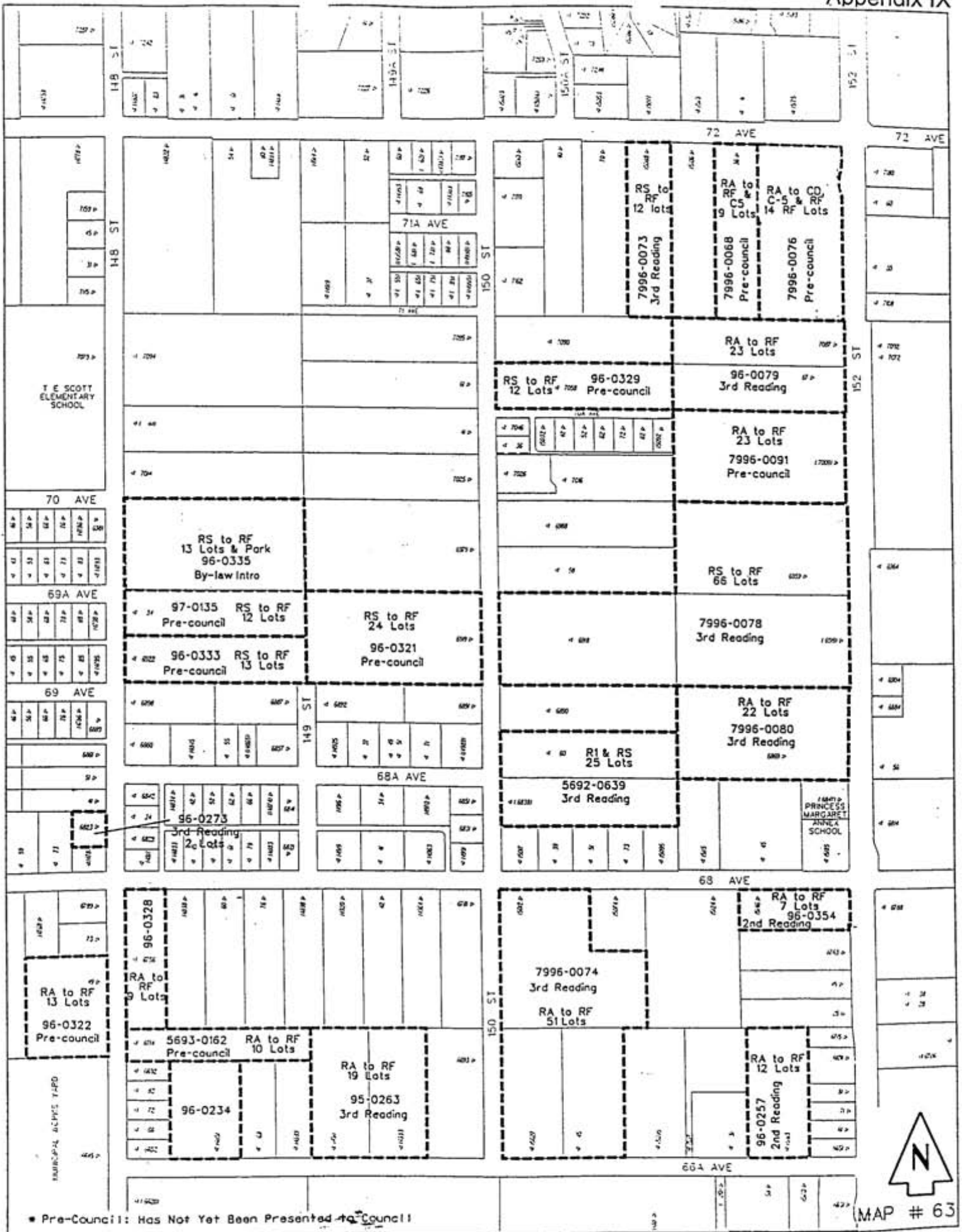
A general concept which tries to reflect these conditions is illustrated on the page following. It is proposed that the East Newton entrance/gateway feature be incorporated as part of the townhouse site abutting 72nd and 144th Avenue, and that it comprise either a public space (part of the right of way), or alternatively the design feature could be retained as private property, but with provision for public access. The approximate area could be a triangular shaped wedge, extending about 10 metres back from the property intersection at 144th Street and 72nd Avenue. Private access to the townhouse project can be incorporated through a gated feature as illustrated on the top drawing in the sample illustration. Seating and kiosk areas, and the architectural feature would be common and publicly accessible space. The actual architectural feature can be designed as part of the townhouse complex, and could for example, include a tower structure (Clock tower), fountain, flagpoles, raised flower beds or similar features. It is important that any design be cognizant of maintenance requirements, and potential vandalism.

The illustration is intended purely as a guideline. More specific design should be carried out as part of the concept plan for the townhouse project, and should be reviewed by the City upon rezoning.





EAST NEWTON - GATEWAY FEATURE



# *East Newton (South)*

## **Neighbourhood Concept Plan**

**Stage Two Report**

## **Servicing and Financial Details**

Prepared for:

The Owners and The City of Surrey

**October 1997**





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1398-050-00-21

1997 October 30

City of Surrey  
14245 - 56 Avenue  
Surrey, BC  
V3W 1J2

Attention: Mr. Jorgen Johansen, P.Eng.  
NCP Project Manager

Dear Sir:

**Re: Stage 2 Report - East Newton (South) NCP**


Enclosed please find two (2) bound and one (1) unbound, reproducible copy of our final Stage 2 Report - East Newton (South) NCP.

This final report incorporates staff comments, as well as an updated financial analysis.

We trust that all the material is in order.

Yours truly,

UMA ENGINEERING LTD.

  
Ernesto Aguilar, P.Eng.  
Project Engineer

EA/cv  
Enclosure

**UMA ENGINEERING LTD.**  
**THIRD PARTY DISCLAIMER**

This report has been prepared by UMA Engineering Ltd. ("UMA") for the benefit of the client to whom it is addressed. The information and data contained herein represent UMA's best professional judgement in light of the knowledge and information available to UMA at the time of preparation. Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by the client, its officers and employees. UMA denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents without the express written consent of UMA and the client.

To the Readers of this report:

The Engineering servicing plans included within this document are conceptual in nature reflecting UMA Engineering Ltd.'s best judgment based upon the information available at the time of preparation of the plans. Changes to these plans may become necessary from time to time as more detailed information becomes available and, as such, the City may make changes to the conceptual servicing plans within this report without notice.

Each development application affected by this plan will have to comply with the requirements of all City Bylaws, policies, design criteria, construction standards and other relevant regulations current at the time of development. Where it is specifically mentioned within this report that the recommended proposal will differ from the City Bylaw or policy, a Development Variance Permit will be required to be approved by Council at the time of the application processing.

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## 1.0 INTRODUCTION

The East Newton (South) Neighbourhood Concept Plan (NCP) was prepared on behalf of property owners for the area between 72nd Avenue and Hyland Creek, extending from 144th Street on the west to 152nd Street to the east and on behalf of the City of Surrey. The total area comprises approximately 178 hectares (440 acres). This report deals with engineering servicing and financial issues, while the Stage One report issued in February 1996 dealt primarily with land use.

The Neighbourhood Concept Plan represents the most detailed concept plan in the planning hierarchy in Surrey. General goals and policies are established in the community wide Official Community Plan. In turn, the Community Plan provides the foundation for Local Area Plans (LAP) which identify the land use and development framework for sub-regions of the City such as East Newton, West Newton, Cloverdale, etc. The Neighbourhood Concept Plan comprises a sub-unit of the Local Area Plan, and is intended to provide sufficient detail and information to act as a guide to future subdivision and rezoning in the neighbourhood. The NCP must be in substantial compliance with the land use policies defined in the Local Area Plan.

## 2.0 PROJECT STAGES

The Neighbourhood Concept Plan must deal with land use, engineering and cost recovery issues. During the process of preparing this document, a decision was made by the Steering Committee representing the owners, and agreed to by City staff, that the project be completed in two major stages. These stages are:

- *Land Use and Servicing Concept, and*
- *Engineering and Financial Issues.*

It was felt that initial agreement, and Council approval should be obtained with respect to the Land Use Plan, which includes conceptual engineering and is covered in the Stage One report. That report was submitted to Council on April 2, 1996. Figure A-2 in Appendix A contains the Land Use Plan. This Stage Two document deals comprehensively with the engineering issues, including transportation and the financing of utility services. The report also provides information on amenity contributions related to park development, library improvements, fire protection and similar services. Detailed background material and cost estimates are incorporated in the Appendix.

## **3.0 THE NCP PROCESS**

### **3.1 OWNER PARTICIPATION**

A high degree of property owner involvement occurred throughout the planning process. The property owners contribute the majority of costs associated with the NCP, and the consultant is responsible directly to the owners who are represented throughout the project by a Steering Committee, and to the City in relation to its requirements. For this NCP, the Steering Committee was comprised of representatives of several sub areas of the neighbourhood. A total of five sub areas were defined.

Surrey staff participated in the NCP process in a resource and technical capacity. City staff representatives are also responsible for final recommendations to Council to ensure the Plan meets Council policies.

The NCP process is designed to ensure the adequate provision of community facilities, both "hard" services such as utilities and roads, but also "soft" services such as playgrounds, library facilities and other social amenities. By reviewing these items in a timely manner, Surrey is assured that the required services and community facilities will be available as development occurs.

### **3.2 AGREEMENT TO PLAN**

Since the owners contribute directly to the planning process, final completion of the plan assures a majority consensus. This consensus is further enhanced by the City requirement that a clear indication must exist of owner agreement with the principles of the land use plan, and the servicing and financial aspects. The public meetings held on the Stage One report were designed to obtain public consensus on the land use plan, while a public meeting on the Stage Two report is designed to establish agreement on engineering and financial aspects.

## 4.0 ENGINEERING PARAMETERS

An analysis has been made of both the off-site and on-site improvements to arrive at a general indication of the required utility and road improvements. Detailed costs for some of the required infrastructure are included. The City of Surrey provided the unit rates used for these estimates. A copy of the unit rates can be found in *Appendix F*.

### 4.1. ROADS AND TRANSIT

#### 4.1.1 Roads

The study area is currently serviced by roads that follow a rectilinear grid pattern. Arterial roads include 72 Avenue, 152 Street and 144 Street. Upgrading of 152 Street to four lanes and turning lanes, has already occurred. It is also proposed that 72 Avenue be expanded to four lanes. Major Collector Roads include 148 Street and 68 Avenue. Minor Collector Roads are 66 Avenue and 150/149A Street. The East Newton Local Area Plan Traffic Impact Study (Urban Systems, June 1995) recommended that 144 Street: 64-72 Avenue be included in Surrey's Ten Year Servicing Plan. The study also recommended a traffic signal for the intersection of 68 Ave/144 Street. Considering the grade and sight-line restriction, costs for this signal are higher than most others to reflect the cost of re-grading 144 Street and relocating driveways.

The new alignment of 150/149A Street is proposed to eliminate the need for 3 T intersections. The intersection of these two roads is proposed to be realigned, to be reflected in both this NCP, and the NCP for the north neighbourhood. This will minimize conflict with existing housing units. This intersection provides the best alignment, creates minimal interference with established homes, and also offers the safest intersection in view of grades and sight distance on 72 Avenue. An additional entrance point to 152 Street was required. The alignment of 70 A was chosen because it is a partial existing right-of-way serving several established homes. Alternatives were examined, but were rejected because of interference with major tree stands and/or lack of existing right of way. Surrey design standards propose a maximum grade of 12% for this type of road. The current grade is slightly in excess of 15%. For any exceptions to this current standards, approval from the City Engineer is required. A development variance permit is required to allow the steeper grade.

The remainder of the roads in the study area are local roads. Both limited and through local roads are present in the proposed road plan. This information is summarized in *Table 4.1.1*.

**Table 4.1.1  
Road Hierarchy**

Road	Classification
72 Avenue	Arterial
152 Street	Arterial
144 Street	Arterial
148 Street	Major Collector
68 Avenue	Major Collector
66A Avenue	Minor Collector
150/149A Street	Minor Collector

*Figure 1*, at the end of this section illustrates the overall road hierarchy for the NCP area. *Table 4.1.2* contains the roadworks required. Some of these works were recommended by the East Newton Local Area Plan Traffic Impact Study (Urban Systems, June 1995).

**Table 4.1.2  
Roadworks - Capital Works Required**

Location	Works	Capital Cost	In Current Ten Year Plan	DCC Item
72 Ave: 144 -152 Street	Arterial Widening	\$3,500,000	No	Yes
144 Street: 64-72 Avenue	Arterial Widening	\$4,000,000	Yes	Yes
148 Street: 64-72 Avenue	Maj. Collector Wide. 8.5m Interim	\$1,100,000	Yes	Yes
68 Ave: 144-152 Street	Maj. Collector Wide. 8.5m Interim	\$1,100,000	Yes	Yes
144 Street / 68 Avenue	Traffic Signal	\$160,000	No	Yes
148 Street/ 64 Avenue	Traffic Signal	\$85,000	Yes	Yes
152 Street / 68 Avenue	Traffic Signal	\$85,000	Yes	Yes

Details regarding roadway features can be found in Schedule "A" of Surrey's Subdivision and Development Bylaw No. 8830. *Figure A.1*, in *Appendix A* of this document, illustrate the typical cross section for each road classification. Reference is also made to Surrey's Standard Document. The proposed intersection control devices within the NCP study area are depicted in *Figure 2*.

#### 4.1.2 Parking Restrictions

On-street parking will be permitted on local and collector roads. Parking that is now permitted on arterial roads will be eliminated when the arterial road is upgraded to the ultimate four lane design. On collector roads, parking will be limited to one side of the street, in order to accommodate bicycle-friendly lanes. On-street parking restrictions on collector roads are illustrated in *Figure 3*.

#### 4.1.3 Major Land Use Area Access Points

For several of the major development sites special access points should be provided in order to minimize traffic conflicts. Access to parking and loading facilities for the proposed new school site west of 149A/150 Street is proposed to be limited to an entrance opposite 70 Avenue (see *Figure A-4*).

A number of parcels along 72 Avenue, 68 Avenue and on 144 Street have been designated for townhouse development at RM-15 densities. Many of the parcels in this area could be developed on a free standing basis however to reduce the number of access points, larger consolidated sites are recommended. *Figure A-3* in *Appendix A* illustrates a potential pattern of consolidation as well as possible access driveway locations. Access points to 144 Street and 72 Avenue are avoided or minimized, with preference given to more minor roads. It is proposed that overall site areas be at least 4000m<sup>2</sup> to encourage parcel consolidation and less fragmented development. While the sketch showing access points offers potential suggestions for site amalgamation, it is recognized that other valid options exist, and any similar consolidation which does not isolate parcels into undevelopable properties is deemed acceptable. In addition, if access points can be combined through owners entering into reciprocal access agreements, enforced through registered easements, traffic access issues can be minimized.

#### 4.1.4 Transit

BC Transit currently provides a bus service along 152nd Street connecting Guildford Town Centre with White Rock Centre. In addition, a bus service currently operates along 144 Street between 72 Avenue and 60 Avenue. Indications are that future transit services will be provided on 68 Avenue between 144 Street and 148 Street, and on 148 Street from 68 Avenue north. Arterial roads are the only locations where bus pullouts will be required. Since a buffer strip is proposed along 152 Street provision for a pullout can be integrated within the buffer area. The proposed transit plan is illustrated by *Figure 4*.

#### 4.1.5 Pedestrian Links

Pedestrian linkages represent an important feature of this neighbourhood. Extensive consideration has been given to connecting the major park sites in the neighbourhood as well as institutional and commercial activities. Continuity is offered throughout the area for pedestrian connections, by incorporating both green corridors, and portions of road served by sidewalks. Where cul-de-sac roads are provided, larger cul-de-sac roads include walkways to connect to adjacent areas. Detailed information on pedestrian linkages is included in *Figure A-5* in *Appendix A*



## 4.2 SANITARY SEWERS

At present, the study area has some sanitary sewers. All of the existing sewers feed into an existing major GVS&DD trunk sewer. Within the study area, the connections to the GVS&DD trunk sewer occur at 70A Avenue, 68 Avenue and 66A Avenue. A 750mm - 900mm trunk sewer also exists along 66A Avenue. With gradual redevelopment to urban type densities, it is intended that the entire area be serviced with sanitary sewer.

The neighbourhood area west of the existing major GVS&DD trunk sewer, would be serviced by that trunk sewer in so far as the lands are above the ultimate hydraulic surcharge grade line. The Minimum Building Elevation (MBE) for homes to be serviced by gravity to the GVS&DD sewer must be 15.0 metres. The remaining land area below the hydraulic grade line is part of a larger sanitary catchment area which includes the proposed East Newton Business Park (situated south east of this NCP area). The catchment area encompassing the East Newton Business Park is shown in *Figure 5*. The western boundary of this catchment area follows the 15.0 metre contour. This area will require a community lift station and a forcemain that would discharge to the GVS & DD trunk sewer. A previous study has indicated that the most probable location for a lift station to service this area, would be on 67 Avenue at approximately 154 Street. This will require a 30m by 30m land area. It is recommended that existing connections to the GVS&DD trunk not to be used for development unless the MBE's are above 15 metres elevation.

NCP proponents located within the area east of and below the design hydraulic grade line of the GVS&DD sewer have indicated a desire to develop their land in the very near future. Since the timing of the proposed East Newton Business Park is not known at this point, the proponents might be in a situation of paying major costs for the ultimate lift station without the aid of a financial contribution from the Business Park owners. For that reason, a preliminary review has been completed for different options to service the strip along 152 Street. One of the options is an interim lift station. As there is no indication that the Business Park lands are being brought forward for development in the near future, it is recommended that an interim lift station solution be permitted for the benefit of the NCP proponents in that area. *Appendix B* contains interim and ultimate pump station concepts as well as cost estimates. The estimates for the interim pump station alternative are preliminary only and are intended only to assist the area landowners in obtaining an order of magnitude cost. The financing aspects are reviewed further in Section 5.0 of this report.

The sanitary catchments for the study area have been delineated and are shown in *Figure 6*. *Table 4.2.1* shows the corresponding flows for each of the catchment areas.

**Table 4.2.1  
Sanitary Flows**

Area	Designation	Area (ha)	Population	Flow (l/s)	Peaking Factor	Peak Flow (l/s)
1	RM-15 Townhomes	8.3	598	2.42	3.93	9.52
2	Cemetery	37.7	10	0.04	4.42	0.18
	RM-15 Townhomes	4.0	288	1.17	4.08	4.78
					<b>Total:</b>	<b>4.96</b>
3	RM-15 Townhomes	9.2	663	2.69	3.91	15.76
	SF Units		108	0.43	4.23	1.85
					<b>Total:</b>	<b>17.61</b>
4	SF Units	1.6	417	1.69	4.01	6.78
	RM-10		96	0.39	4.25	1.66
	Church/School		85	0.34	4.26	1.45
	Park		0	0.00	4.50	0.00
					<b>Total:</b>	<b>9.89</b>
5	SF Units		78	0.31	4.27	1.35
6	SF Units		63	0.25	4.29	1.09
7	SF Units		30	0.12	4.35	0.52
8	SF Units		159	0.64	4.18	2.69
9	SF Units		279	1.13	4.09	4.62
10	RM-10	1.2	72	0.29	4.28	1.24
	School	2.8	140	0.56	4.20	2.38
	SF Units		33	0.13	4.34	0.58
					<b>Total:</b>	<b>4.20</b>
11	SF Units		213	0.86	4.13	3.57
12	SF Units	1.0	255	1.03	4.10	4.24
	Church		50	0.20	4.31	0.87
					<b>Total:</b>	<b>5.11</b>
13	SF Units		243	0.98	4.11	4.05
14	SF Units		264	1.06	4.10	4.38
15	SF Units		165	0.66	4.17	2.79
16	SF Units		54	0.21	4.30	0.94
17	SF Units		159	0.64	4.18	2.69
18	C-4/CD	0.70	35	0.14	4.34	0.61
	SF Units		324	1.31	4.06	5.32
					<b>Total:</b>	<b>5.93</b>

Note: 1. Population based on 3.0 people per household for SF Units and RM-10, 50.0 people per ha for commercial (C-4/CD), and 2.4 people per household for RM-15.

2. RM-15 : 30 units/ha, RM-10: 20 units/ha.

A schematic of the proposed sanitary sewer layout is shown in *Figure 7*. The number of connections to the GVS&DD sewer have been minimized as the GVRD will not permit individual connections. Proposed connections to the GVS&DD trunk sewer are at 70A Avenue and 68A Avenue. It is understood that there is sufficient capacity in the sanitary trunk on 66A Avenue to handle the flows from the proposed development. Although the system can accommodate the sanitary flow from the NCP study area, the remaining capacity could be taken up by areas outside the NCP. When the capacity of the 66A Avenue main is reached, a new trunk will be required on 64 Avenue. This trunk, when required, will be constructed by the City only after funds have been identified and approved by Council. Thus the remaining sewer capacity will require review at the time of each application. No other trunk sewer requirements have been identified. *Table 4.2.2* contains the recommended sanitary works for the East Newton NCP area.

**Table 4.2.2**  
**Sanitary-Capital Works Required**

Location	Works	Capital Cost	In Current Ten Year Plan	DCC Item
67 Avenue and 154 Street	Lift Station	\$1,216,000	Yes	Yes

In addition to the items noted above, an interim lift station might also be required to be constructed (for the area east of the GVS & DD sewer) which would be the responsibility of the developer(s). The developer(s) would also be responsible for maintenance of the interim lift station, the future gravity sewer between the ultimate and interim lift stations and obtaining the right-of-way for the future gravity sewer. The City will require a gravity sewer connection from the interim lift station, towards the ultimate lift station, along 152 Street and across the agricultural lands to where the gravity sewer meets the alignment of 153 Street. The developer must obtain the necessary right-of-way for this future installation. Construction of local sanitary sewers within the study area will be the responsibility of each Developer as required, in accordance with the Subdivision Control Bylaw.

### 4.3 WATERMAINS

Water to the NCP study area is widely accessible off-site. The majority of the East Newton NCP area is located within the 90m HGL pressure zone with the exception of the northwest section which is located within the 135m HGL zone. Water to the East Newton NCP is supplied from the Newton Pump Station located at 127A Street and 62A Avenue. A 450mm diameter feedermain supplies water to several gridmains at Hyland Road and 138 Street. The existing water distribution system has an adequate network to provide sufficient quantities of water to the study area, and no off-site

watermain upgrades are anticipated. Similarly, the areas within the study boundaries are also well serviced with grid mains. Appendix C contains a listing (size, material) of the existing network.

A computer model using the program "Waterworks for Excel" was prepared and used to determine the deficiencies in the existing network. The design criteria established by the City of Surrey for watermain design requires that the proposed mains be capable of operating under the following conditions:

<u>Demand Condition</u>	<u>Residual Head</u>	<u>Max. Main Velocity</u>
Peak Hour Demand	28 m	----
Max. Day Demand plus fire flow	14 m-only at test hydrant	2 m/s

The distribution system proposed for this study area was analyzed in accordance with the above criteria. A representation of the model is shown in *Figure 8*. Critical locations on the network were assigned node numbers. Since the fire flow condition is the determining criteria for watermain design in this application, fire flows were allocated at critical locations in the network and the residual head at these nodes was verified.

*Appendix C* contains water model simulations at critical locations. Several fire flow deficiencies were identified and the following upgradings are required to the existing system:

- Existing watermain on 70A Avenue east of 150 Street from 100mm to 200mm diameter.
- Existing watermain on 71 Avenue west of 150 Street from 100mm to 200mm diameter.

All of the above-noted mains are local and therefore the Developer's responsibility. Installations of new watermains are limited to local distribution mains to service individual developments. The ultimate development as proposed will have an estimated average day and peak day demands as follows:

	<b>Average Day</b>	<b>Peak Day</b>
Single Family Residential	19.62 l/s	78.48 l/s
Townhouse Residential	10.46 l/s	41.84 l/s
Institutional	11.59 l/s	46.36 l/s
Commercial	0.26 l/s	1.04 l/s
<b>Total</b>	<b>41.93 l/s</b>	<b>167.72 l/s</b>

Fire flow calculations were based on the following assumptions:

- Minimum residual pressure of 14m at the hydrant being tested;
- Residential fire flow of 60 l/s;
- Townhouse fire flow of 120 l/s;
- Industrial fire flow of 250 l/s.
- Commercial fire flow of 120l/s; and
- School fire flow of 120l/s.

Within the 90m HGL pressure zone, the existing 300mm diameter mains provide a sufficient grid system to provide the required fire flows. All new mains will require a minimum diameter of 200mm. To provide a secondary water supply, the 300mm diameter main on 72 Avenue should be extended from the cemetery to 148 Street. A PRV station installed at the pressure zone boundary is required. This is an overall system need for the City's waterworks system and will be constructed under Capital Works. *Table 4.3.1* lists the water works which are recommended for the study area.

**Table 4.3.1  
Water- Capital Works Required**

Location	Works	Capital Cost (\$)	In Current Ten Year Plan	DCC Item
70 Avenue/ 148 Street	PRV Station	\$60,000	Yes	Yes
72 Avenue: 150-152 Street	300mm main	\$168,000	Yes	Yes
144 Street: 68-72 Avenue	300mm main	\$484,000	Yes	Yes
152 Street: 70-72 Avenue	300mm main	\$121,000	Yes	Yes
72 Avenue: 147-148 Street	300mm main	\$65,000	Yes	Yes
144 Street: 70 A - North	Replacement	\$38,000	Yes	Yes
70A Ave: 144 - 144 A Street	Replacement	\$38,000	Yes	Yes
70A Ave: 150 Street-East	Replacement	\$69,000	Yes	Yes
71A Avenue 150 Street-West	Replacement	\$34,000	Yes	Yes

There will be a requirement for each owner/developer to prove adequate fire protection is provided at the time of subdivision application. The ultimate grid system will provide fire protection, but only at completion of the entire system. Until that time, some mains may have to be larger than those proposed in the NCP to achieve interim fire flows. Prior to submission for Building Permit, the applicant must confirm that they can meet the fire flow requirements. In cases where the grid system cannot provide sufficient flows to conform to the "*Fire Underwriters Survey Guide to Recommended Practice*", the applicant must demonstrate other means to conform to these guidelines. A schematic of the proposed system is shown in *Figure 9*.

## 4.4 STORM SEWERS

The East Newton NCP area has three main catchments, two outlet to Hyland Creek and one to Bear Creek. Drainage catchment areas were delineated using contour plans obtained from the City. Catchment Area 1, located west of 148 Street is approximately 120 ha in area (the portion within the NCP boundary is approximately 84ha) and drains south to Hyland Creek. Catchment Area 2, located between 148 Street and 152 Street is approximately 85ha (the portion within the NCP boundary is approximately 73ha) in area and drains east to a ditch on 71 Avenue and eventually into Bear Creek. Catchment Area 3, located south of 68 Avenue is approximately 23ha, with most of the area in the NCP boundary. It drains south to Hyland Creek. Presently, a large part of the NCP area is serviced by ditches. *Figure 10* illustrates the three catchment areas. The total drainage area being investigated is approximately 228ha, with the NCP portion of this area being slightly less than 180ha.

### 4.4.1 Land Use

#### *A. Catchment Area 1*

Existing development within Catchment Area 1 consists of a new residential single family subdivision on the west side of 144 Street, and single family residential development along 148 Street. The Valley View Cemetery, approximately 36ha in area, is located between the two residential areas. South of the cemetery and 68 Avenue, are large 2 ¼ acre (1ha) single family lots which back onto the Industrial lands which are located along 66th Avenue and the railway right of way. Development within the industrial lands among others includes the A&B Block Company, Moznic Trucking, and the City of Surrey Parks and Recreation Maintenance yard.

Future development proposed within Catchment Area 1 includes townhouse development along the east side of 144 Street. Townhouse development is also proposed within the 2 ¼ acre lots south of 68 Avenue between the existing houses and the industrial lands to the south.

#### *B. Catchment Area 2*

Existing development within Catchment Area 2 consists primarily of 2 ½ acre single family residential lots situated along 72 Avenue, 148 Street, 150 Street and 152 Street. An existing development of ¼ and ½ acre lots is located north of 68 Avenue between 148 Street and 150 Street.

Future development within Catchment Area 2 is proposed to consist primarily of 50 ft. single family residential lots. An elementary school site, park land, commercial area and low density housing are also proposed within Catchment Area 2.

**C. Catchment Area 3**

Existing development within Catchment Area 3 consists of 2 ½ acre single family residential lots. South of 66A Avenue is the Sullivan Mews townhouse complex, and a religious academy and dormitory.

Single family residential development is proposed for Catchment Area 3. A new cul-de-sac is proposed south of 66A Avenue near 152 Street to provide access to redevelop the existing one acre single family lots into 50 ft. single family lots.

A summary of existing and proposed future land use as a percentage of total land use is presented in *Tables 4.4.1* and *4.4.2* respectively.

**Table 4.4.1  
Summary of Existing Land Use**

Land Use	Area (ha)	% of Total Area
Institutional	40.4	17.9
Industrial	15.1	6.7
Urban Residential	5.1	2.3
Suburban Residential	145.1	64.2
Roads & Lanes	20.2	8.9
Wooded *	46.4	20.5
<b>Total Area</b>	<b>225.9</b>	<b>100</b>

\* note wooded area is comprised of various other land uses

**Table 4.4.2  
Summary of Future Land Use**

Institutional	43.4	19.2
Industrial	15.1	6.7
Commercial	0.7	0.3
Urban Residential	114.7	50.7
Parks and O/S	9.4	4.2
Roads & Lanes	42.6	18.9
Wooded *	3.0	1.3
<b>Total Area</b>	<b>225.9</b>	<b>100</b>

\* note wooded area is comprised of various other land uses

#### 4.4.2 Topography and Soils

##### *Topography*

The NCP Area generally drains in a southerly direction toward Hyland Creek and in an easterly direction to Bear Creek. The overland grade ranges from 5% to 9% in the uplands and from 0.5% to 2% in the lowlands.

##### *Soils*

Soils information for the catchment area was obtained from "Map 1484A Surficial Geology New Westminster" prepared by the Geological Survey Commission of Canada. Soils within the NCP area consist primarily of Vashon Drift. This type of deposit comprises lodgment till with sandy loam matrix and minor flow till containing lenses and interbeds of glaciolacustrine laminated stony silt. Generally, soil drainage characteristics in the catchment areas are poor with high imperviousness values.

#### 4.4.3 General Site Drainage

Stormwater runoff from the catchment areas occurs primarily as overland sheet flow which is intercepted by the roadside ditches and the storm sewer system. Well defined watercourses, other than roadside and easement ditches, were not observed within the catchment areas. Generally, overland flow paths for major storm events are provided along roads. Hyland Creek receives flows at two outlets:

148 Street storm sewer outfall; and  
151A Street storm sewer outfall.

Bear Creek receives flows at two outlets:

71 Avenue ditch; and  
68 Avenue ditch.

The following sections provide a description of the existing and proposed storm systems and *Figure 10* illustrates the proposed storm system.



## *A. Catchment Area 1*

Catchment Area 1 comprises a total area of approximately 120 ha. It is bounded to the north by 72 Avenue, to the south by the Southern Railway of British Columbia (SRBC) and Hyland Creek, to the east by 148 Street, and to the west by 144 Street. Catchment Area 1 drains in a north to south direction with an average gradient of approximately 5% and outlets to Hyland Creek.

### *Existing Drainage in Catchment Area 1*

Storm drainage from the residential development along the east side of 144 Street is conveyed through storm sewers to a 750mm diameter concrete culvert which crosses under 144 Street and outlets to a ditch which runs along the north side of the railway tracks to Hyland Creek. The residential lands on the west side of 144 Street are currently within an area which are utilizing a neighbourhood detention system which outlets to the 750mm diameter concrete culvert which crosses under 144 Street. The major storm flows are conveyed through the 750mm concrete culvert.

Runoff from the cemetery and the residential development along 68 Avenue collects at a low point on 68 Avenue. The storm water flows under 68 Avenue through an existing 450mm concrete storm sewer which outlets midway through the 2 ¼ acre residential lots into a ditch within an easement. Stormwater then flows southerly through the industrial lands, a ditch along the north side of 66 Avenue. A 750mm concrete storm sewer conveys flows under 66 Avenue to an easement on the west side of the Moznic Trucking holdings. The runoff through this easement between 66 Avenue and Hyland Creek is conveyed in approximately 80m of open ditch and a 70m 750mm diameter culvert.

Runoff from 148 Street is conveyed through a series of existing 375mm, 450mm and 600mm storm sewers which convey flows southerly along 148 Street and outlets into Hyland Creek.

### *Future Drainage in Catchment Area 1*

Analysis has indicated that the existing 600mm storm sewers along 144 Street have sufficient capacity to convey the 100 year post development peak flows from the proposed townhouse development to the existing 750mm concrete culvert under 144 Street. The minor system flows will be diverted at 144 Street and 68 Avenue.

The major storm will continue to be conveyed south along existing road ROW's to the north ditch in the SRBC ROW. It will flow through the ditch and discharge to Hyland Creek.

The diverted minor storm flow (at 144 Street and 68 Avenue) will be conveyed through a proposed 600mm diameter storm pipe along 68 Avenue and a 750mm diameter storm pipe to eventually drain into Detention Facility #1. Several locations for Detention Facility #1 have been investigated. One of the alternate proposed locations is in the vicinity of 67 Avenue and 146A Street. Due to the fact that drainage from the lands west of 144 Street are being conveyed to this detention facility, it may be possible to abandon the existing detention facilities in this area. If these detention facilities are to be abandoned, further study will be required to determine if upgrades to the local storm system on the west side of 144 Street would be required.

A 450mm diameter storm sewer will convey the minor system flows along 68 Avenue from 148 Street west to approximately 146A Street. Runoff will then be conveyed through the townhouse development to Detention Facility #1.

The proposed 750mm diameter storm sewers crossing 68 Avenue at 146A Street will have sufficient capacity to convey the future peak flows under 68 Avenue. The runoff to this location will collect flows from the cemetery as well as the storm sewers on 68 Avenue.

The eastern portion of Catchment Area 1 will also be directed to the Detention Facility #1. This will be achieved by constructing a diversion at 67 Avenue and 148 Street. Minor system flow from 148 Street will be directed west along a new storm sewer in the 67 Avenue ROW.

Detention Facility #1 has been sized to contain approximately 2500m<sup>3</sup> of dead storage and 8800m<sup>3</sup> of water from live storage. It may be located partially on the Surrey Works Yard 0.4ha (1 acre) and 0.6ha (1.47 acre) on the townhouse site. The facility will primarily serve to improve the water quality of the storm water runoff, but will also provide some flow attenuation. This concept is illustrated in *Figure D-2* in *Appendix D*. It will be most effective for frequent storm events up to a five year return period.

Detention Facility #1 will outlet to an existing ditch on the west side of the works yard and continue to flow in an open ditch along the north side of 66 Avenue. Some upgrading/rehabilitation of the ditches on the west side of the Works Yard and the north side of 66 Avenue is required. These ditches will be required to convey the 1:100 year return period design storm flows estimated to be 4.7m<sup>3</sup>/s.

A new 1050mm diameter culvert should be installed beneath 66 Avenue. This culvert in combination with the existing 450mm diameter pipe, should have sufficient capacity to convey the upstream runoff beneath 66 Avenue.

The existing open channel and culvert between 66 Avenue and Hyland Creek on the west side of the Moznic Trucking site, will also require some upgrading. A wider easement should be acquired and a 1050mm diameter pipe needs to be installed to parallel the existing concrete culvert.

A small area in the southeast portion of Catchment Area 1 will not be picked up by Detention Facility #1. It is anticipated that only 1.5ha of new development will occur consisting of 17 proposed single family units on 66A Avenue and three (3) units on 148 Street. Source control will be required for each of the homes in the form of roof leader disconnection. Further, the existing ditches on 148 Street, south of 65A Avenue, should be retained. These open ditch swales will provide some water quality improvement. If 148 Street is to be widened, then a wider easement should be obtained and the open ditches/swales maintained.

### ***B. Catchment Area 2***

Catchment Area 2 comprises a total area of approximately 84 hectares, it is bounded to the north by 72 Avenue, to the south by 68 Avenue, to the west by 148th Street and to the east by 152 Street. Catchment Area 2 generally drains in a west to east direction at an average grade of 6% and outlets through a 1050mm diameter storm sewer into the 71 Avenue ditch. The 71 Avenue ditch drains to Bear Creek which discharges to the Serpentine River.

#### *Existing Drainage in Catchment Area 2*

The existing storm sewers, 300mm to 600mm diameter on 72 Avenue collect storm drainage from lots fronting 72 Avenue and a portion of the area between 148 Street and 150 Street. The storm sewer system on 72 Avenue ties into 152 Street and the 1050mm outlet to the 71 Avenue ditch. The  $\frac{1}{4}$  and  $\frac{1}{2}$  acre lots between 148 Street and 150th Street drain through roadside ditches to 68 Avenue. The existing 450mm and 600mm storm sewers on 68 Avenue convey storm drainage east to 152 Street. The area between 150 Street and 152 Street drains east to 152 Street where it is collected in a series of 200mm diameter storm sewers with headwalls. Existing 600mm, 750mm and 900mm storm sewers along 152 Street convey drainage from 68 Avenue and 72 Avenue to the 1050mm outlet to the 71 Avenue ditch.

#### *Future Drainage in Catchment Area 2*

In the future, runoff from Area 2 will drain from 148 Street to 152 Street along 72 Avenue, 70A Avenue, 68A Avenue and 68 Avenue. The existing 300mm to 600mm storm sewers on 72 Avenue have sufficient capacity to convey the 100 year post-development peak flow rates to 152 Street. They serve sub-catchments A3, A4 and A5.

The proposed storm sewer on 70A Avenue will service catchments C1, A8 and most of A7 (*Figure 11*). Runoff will generally be conveyed east from 148 Avenue to 152 Avenue along the 70A Avenue ROW.

The middle portion of Area 2 will be serviced by a new trunk sewer along 68A Avenue. Subcatchments C2, C3 and A6 are proposed to discharge to a 600mm diameter storm sewer located on 68A Avenue between 150 Street and 152 Street.

The existing 450mm to 600mm storm sewers on 68 Avenue have sufficient capacity to convey the post development runoff from sub-catchments C5 and C4.

A storm sewer is proposed along the frontage road which parallels 152 Street. This storm sewer will intercept the runoff from the 68A Avenue and 70A Avenue storm sewers and convey it to the 71 Avenue ditch. The new 600mm diameter storm sewer parallel to 152 Street was proposed to minimize disturbance to the newly constructed road. The sewers along 152 Street outlet to the 71 Avenue ditch.

#### *Downstream Drainage East of 152 Street*

The 71 Avenue ditch receives runoff from Catchment Area 2 as well as runoff from the 50 ha adjacent lowlands. The 71 Avenue ditch conveys runoff through the agricultural lowlands to Bear Creek (see *Appendix D, Figure D-1*). The industrial lands to the east of the study area also discharge to the lowlands via the 68 Avenue ditch. A separate study (*71 Avenue Watershed Analysis, UMA Engineering - April 1996*) addresses the runoff impact of new upland development on the agricultural lowlands east of 152 Street and methods to mitigate the impacts. This involved:

- a review of the existing and future flows to the 71 and 68 Avenue ditches;
- an assessment of the conveyance capacity of the ditches and the hydraulic structures; and
- examining of the capacity of the floodboxes.

The 71 Avenue ditch is confined by dykes which are approximately 1 to 2 meters above the agricultural lowlands. Drainage from the ditch to Bear Creek occurs through a 750mm CSP floodbox. At present, flooding in the lowlands area is caused either by high water levels in Bear Creek which spill over the existing Bear Creek dyke when the Bear Creek water levels are at an elevation of approximately 2m. In the future, there will be a small increase in the runoff volumes from the upland areas. In summary, the analysis found that:

- Overtopping of the 71 Avenue dyke occurs under existing conditions for the two year through the 100 year 24 hour event when the water in Bear Creek is higher than in the 71 Avenue dyke and no flow occurs through the floodbox. This may occur when water levels on the Bear Creek system exceed 1m and during a 10 year return period flood on the Serpentine River system.

- Flooding in the lowlands occurs under existing conditions from overtopping of Bear Creek during the 10 year 5 day winter storm event.
- New development in Catchment Area 2 and the industrial lands has the potential to increase the frequency and volume of runoff to the agricultural lowlands, if the dykes are not high enough or the flood boxes do not have sufficient capacity.

Based on the study findings, it is recommended that:

- One additional 900mm floodbox be installed at the 71 Avenue ditch outlet to Bear Creek.
- The 71 Avenue ditch/dyke be raised to an elevation of 2.9m.
- A 35m ± right of way be provided for the 71 Avenue ditch (*Figure D-4, Appendix D*), unless further analysis shows that a minimum dyke height of 2.9m can be obtained with a narrower right of way.
- Culverts discharging to the 71 Avenue ditch from the lowland fields should be inspected to ensure that they have flap gates in proper working order. The culverts draining the fields will have to be extended, and several new culverts installed.
- The 71 Avenue ditch generally appears to be in good condition. Removal of sediment and vegetation may be required at selected locations.

### **C. Catchment Area 3**

Catchment Area 3 comprises a total area of approximately 23 hectares. It is bounded to the north by 68 Avenue to the south by 66A Avenue, to the east by 152 Street and to the west by 148 Street. Catchment Area 3 drains in a north to south direction at an average grade of 5% to 66A Avenue and outlets to Hyland Creek.

#### *Existing Drainage in Catchment Area 3*

Storm drainage is picked up along 66A Avenue in an existing 600mm storm sewer which conveys flows through the religious academy parking lot and outlets into Hyland Creek. At present, 66A Avenue drains to roadside a ditch for most of its length.

### *Future Drainage in Catchment Area 3*

It is recommended that storm drainage from the future developed residential lands north of 66A Avenue be conveyed through the existing 600mm diameter storm sewer to Detention Facility #2. Several locations for Detention Facility #2 have been investigated. In general, it should be located within or immediately adjacent to the NCP boundary at the south end of Catchment Area 3. The precise location of the facility will have to be worked out with the developers and landowners in the vicinity of 66A Avenue and 151A Street. Potential locations include a facility parallel to 66A Avenue or a facility at the south end of 151A Street. A facility located in the floodplain was considered, however, the DFO has a policy of not providing detention facilities in the flood plain of creeks. The existing system can handle the five year post development peak flows from subcatchment D1.

In order to handle the flows from subcatchment D2, it is proposed that a 600mm diameter storm sewer be installed parallel to the existing storm sewer between 66A Avenue and Detention Facility #2.

It is also proposed that a diversion structure be located at the upstream end of the facility (65A Avenue and 151 Street). It would direct runoff to Detention Facility #2 until full. When the full runoff would bypass the detention facility and discharge to the small tributary of Hyland Creek. A low flow discharge will be maintained from the detention facility to the tributary.

The major system flows from subcatchment D1 are proposed to be directed overland through an open ditch located along the south side of 66 Avenue. They are then intercepted by the existing 600mm diameter storm.

In the future, the major system flow is proposed to be conveyed through the religious academy partially within the existing and proposed storm sewer, and also overland through the parking lot in the existing ROW. Some re-grading may be required to ensure that overland flow is maintained within the ROW through the parking lot and is directed to the small ravine tributary to Hyland Creek.

#### **4.4.4 Post-Development Peak Flows**

Hydrologic modeling was conducted to determine the existing and post-development flows. Appendix D contains the rainfall data and other data used as input. The catchment areas have been subdivided as shown in *Figure 11*. The peak flow rates shown in *Table 4.4.3* are based on five year and one hundred year return storm with a one hour duration. *Appendix D* contains the computed flows for other storm durations.

**Table 4.4.3**  
**Catchment Area 1 Peak Flow Rates**

Sub-Catchment	Area (ha)	Q 5 year (m <sup>3</sup> /s)	Q 100 year (m <sup>3</sup> /s)
B1	5.0	0.04	0.09
B2	5.9	0.10	0.29
B3	2.3	0.04	0.12
B4	3.6	0.06	0.18
B5	1.1	0.02	0.06
B6	1.2	0.02	0.07
B6B	2.3	0.04	0.13
B7	4.0	0.07	0.19
E1	29.0	0.16	0.38
E2	2.6	0.05	0.15
E3	4.7	0.12	0.31
E4	12.0	0.30	0.68
E5	5.1	0.20	0.41
F1	7.2	0.17	0.39
F2	2.8	0.07	0.16
F3	2.7	0.07	0.15
F4	3.6	0.06	0.17
F5	4.7	0.08	0.23
F6	5.8	0.10	0.29
F7	10.3	0.39	0.75
<b>Outfall</b>	<b>115.9</b>	<b>1.96</b>	<b>4.55</b>

Note: Flows are from the one hour duration design storm.

**Table 4.4.4**  
**Catchment Area 2 Peak Flow Rates**

Sub-Catchment	Area (ha)	Q 5 year (m <sup>3</sup> /s)	Q 100 year (m <sup>3</sup> /s)
A1	6.2	0.03	0.07
A2	4.6	0.02	0.06
A3	2.6	0.03	0.11
A4	1.4	0.02	0.07
A5	4.9	0.07	0.22
A6	6.9	0.15	0.36
A7	11.2	0.17	0.54
A8	12.7	0.24	0.66

Sub-Catchment	Area (ha)	Q 5 year (m <sup>3</sup> /s)	Q 100 year (m <sup>3</sup> /s)
C1	7.8	0.22	0.44
C2	8.8	0.22	0.45
C3	8.2	0.14	0.40
C4	3.8	0.07	0.19
C5	4.0	0.07	0.20
<b>152 Street North of 70 A Avenue</b>	<b>83.1</b>	<b>1.31</b>	<b>3.64</b>

Note: Flows are from the one hour duration design storm

**Table 4.4.5**  
**Catchment Area 3 Peak Flow Rates**

Sub-Catchment	Area (ha)	Q 5 year (m <sup>3</sup> /s)	Q 100 year (m <sup>3</sup> /s)
D1	10.9	0.17	0.51
D2	12.2	0.21	0.53
<b>151 A Street</b>	<b>23.1</b>	<b>0.38</b>	<b>1.03</b>

Note: Flows are from the one hour duration design storm.

#### 4.4.5 Stormwater Detention Facilities

Each catchment area must provide an ultimate drainage solution (detention facility or outfall) prior to any development being allowed to proceed within the specific catchment area. The developers will provide the method for the acquisition and funding for the detention facilities required to service their particular catchment area.

Detention facilities have been proposed in accordance with the City of Surrey's Interim Storm Drainage Criteria. *Figure 10* identifies the most appropriate location for the proposed detention facilities.

Detention Facility #1 receives runoff from Catchment Area 1 including runoff from west of 144 Street. The area along 144 Street was identified in the Hyland Creek Master Drainage Plan, (UMA, 1995), as area HI.

Detention Facility #1 is proposed to contain 8800m<sup>3</sup> live storage and approximately 2500m<sup>3</sup> of permanent storage. The discharge flow rate during a five year return period storm event will not exceed 0.37m<sup>3</sup>/sec.



Detention Facility #2 receives runoff from Catchment Area 3. The existing 600mm diameter storm sewer along 68 Avenue has sufficient capacity to convey the five year post development peak flow rates to the proposed facility. Another storm pipe is proposed to convey runoff from the eastern portion of Area 3 and some of the major system flow. It is proposed that the detention facility be located in the vicinity of 66A Avenue and 151A Street. The precise location will have to be worked out between the landowners and developers in the area and must be approved by the City. Outflow from the pond will be directed to Hyland Creek through the existing channel.

Both these ponds are proposed to be wet ponds. Post development five year peak flow rates have been limited to 50% of the two year post development peak flow rate. Detention pond volume have been sized for the five year, 6, 12 and 24 hour events. *Table 4.4.6* summarizes the storage requirements for the proposed facilities.

**Table 4.4.6**  
**Summary of Storage Requirements**

Detention Facility	Catchment Area(ha)	Q in (m <sup>3</sup> /s)	Q out (m <sup>3</sup> /s)	Volume (m <sup>3</sup> )
Facility 1	94.2	1.01	0.37	8820
Facility 2	23.1	0.28	0.09	1710

(Note: The flows shown are for the 5 year - 12 hour duration storm)

#### 4.4.6 Capital Works

A summary of the proposed storm works within the East Newton NCP Area are presented in *Table 4.4.7*.

**Table 4.4.7**  
**Storm - Capital Works Required**

Location	Description	Capital Cost	In Current Ten Year Plan	DCC Item
<b>1.0 Catchment Area 1</b>				
1.1 144 St./68 Ave.	Diversion structure	\$15,000	No	Yes
1.2 68 Ave.:144-146A St.	600mm dia. sewer	\$228,000	No	Yes
1.3 146A St.:68-67 Ave.	750mm dia. sewer	\$145,350	Yes	Yes
1.4 67 Ave./146 A St.	Detention facility #1 Land Acquisition	\$678,000 \$200,000 <u>\$594,000</u> \$1,472,000	No	Yes
1.5 146A St.:67-66 Ave.	Ditch Improvements Land Acquisition	\$50,000 <u>\$80,000</u> \$130,000	Yes	Yes
1.6 66 Ave.:146A-147 St.	Ditch maintenance	\$20,000	No	Yes
1.7 147 St.:66A - Hyland Creek	1050mm sewer Ditch maintenance	\$97,200 <u>10,000</u> \$107,200	No	Yes
1.8 148 St.:67 Ave.	Diversion structure	\$15,000	No	Yes
1.9 67 Ave.:147 St.-148 St.	600mm dia. sewer	\$142,500	No	Yes

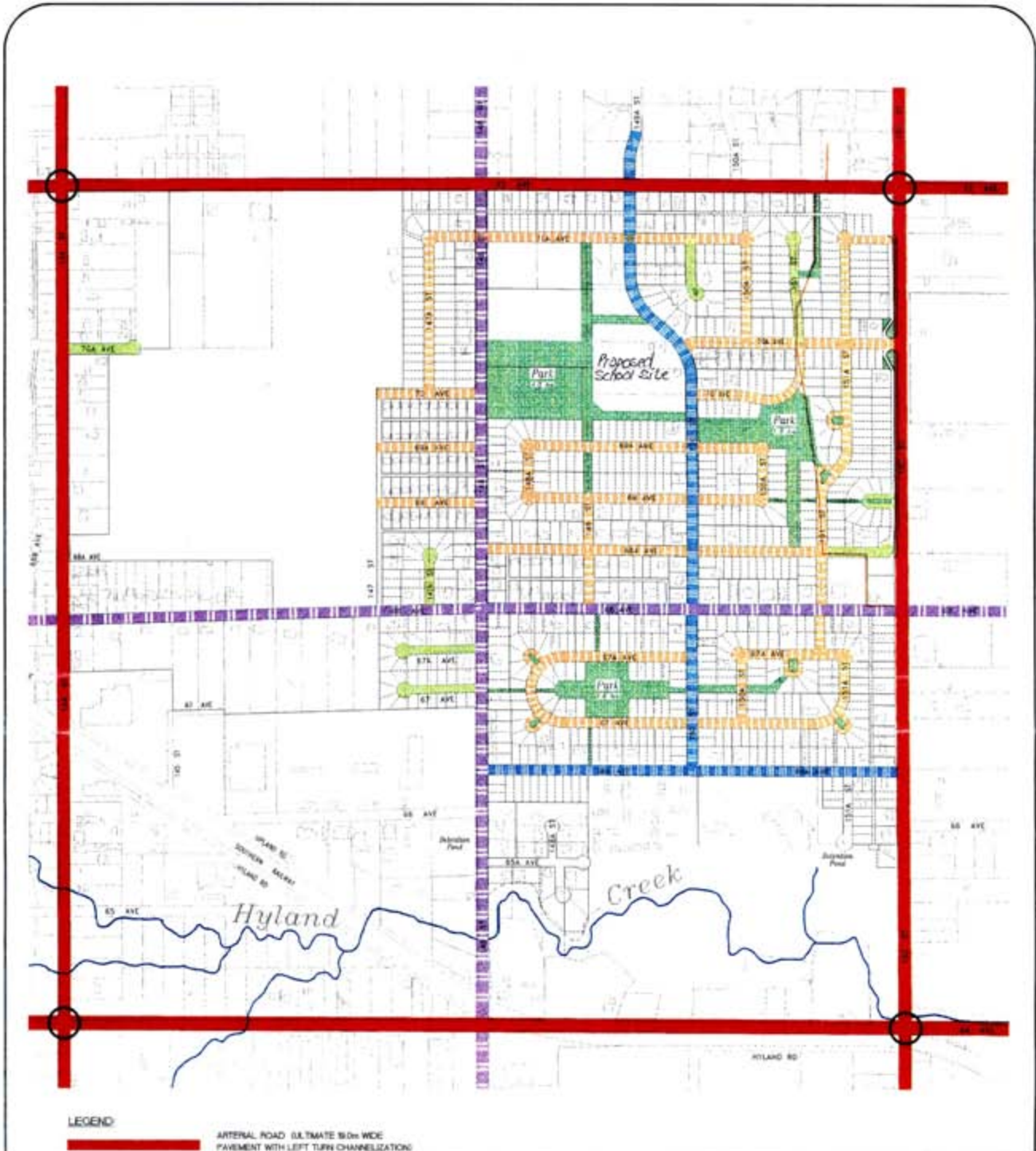
Location	Description	Capital Cost	In Current Ten Year Plan	DCC Item
<b>2.0 Catchment Area 2</b>				
2.1 68A Ave.:150-152 St.	600mm sewer	\$222,300	No	Yes
2.2 71 Ave. Ditch/Dyke	Import Clay Strip existing organics Place clay and compact Land acquisition Hydroseed Ditch maintenance Floodboxes Contingency	\$70,000 \$6,000 \$28,000 \$60,000 \$15,750 \$20,000 \$40,000 \$119,875 \$359,625	No	Yes
2.3 152A:68A Ave.-71 Ave. Ditch	600mm dia. sewer	\$256,500	No	Yes
<b>3.0 Catchment Area 3</b>				
3.1 151A St.:65 Ave.	Detention Facility #2 Land acquisition	\$102,000 <del>\$200,000</del> \$302,000	No	Yes
3.2 151 St./66A Ave. - Detention Facility #2	600mm dia. sewer Land Acquisition	\$171,000 <del>\$ 45,000</del> \$216,000	No	Yes
3.3 151 St./65A Ave.	Diversion structure	\$10,000	No	Yes

Construction cost estimates were completed for some of the above noted works and are presented in *Appendix D*. The detention facility costs were estimated based on assumed land cost found in *Appendix F*.

#### 4.5 HYDRO, TELEPHONE, CABLE AND STREETLIGHTING

All utility systems within the study area whether existing or extensions shall be located underground as required by the City of Surrey's Subdivision Control Bylaw. City Standard Davit Streetlights will be provided by Developers/Owners on all streets.

Typical sections found in *Appendix A* illustrate the positioning of the utilities within the right-of-way.



- LEGEND**
-  ARTERIAL ROAD - ULTIMATE 80m WIDE PAVEMENT WITH LEFT TURN CHANNELIZATION
  -  MAJOR COLLECTOR (ULTIMATE 62m WIDE PAVEMENT)
  -  MINOR COLLECTOR (ULTIMATE 60m WIDE PAVEMENT)
  -  LOCAL ROAD - LIMITED
  -  LOCAL ROAD - THROUGH
  -  EXISTING TRAFFIC SIGNAL

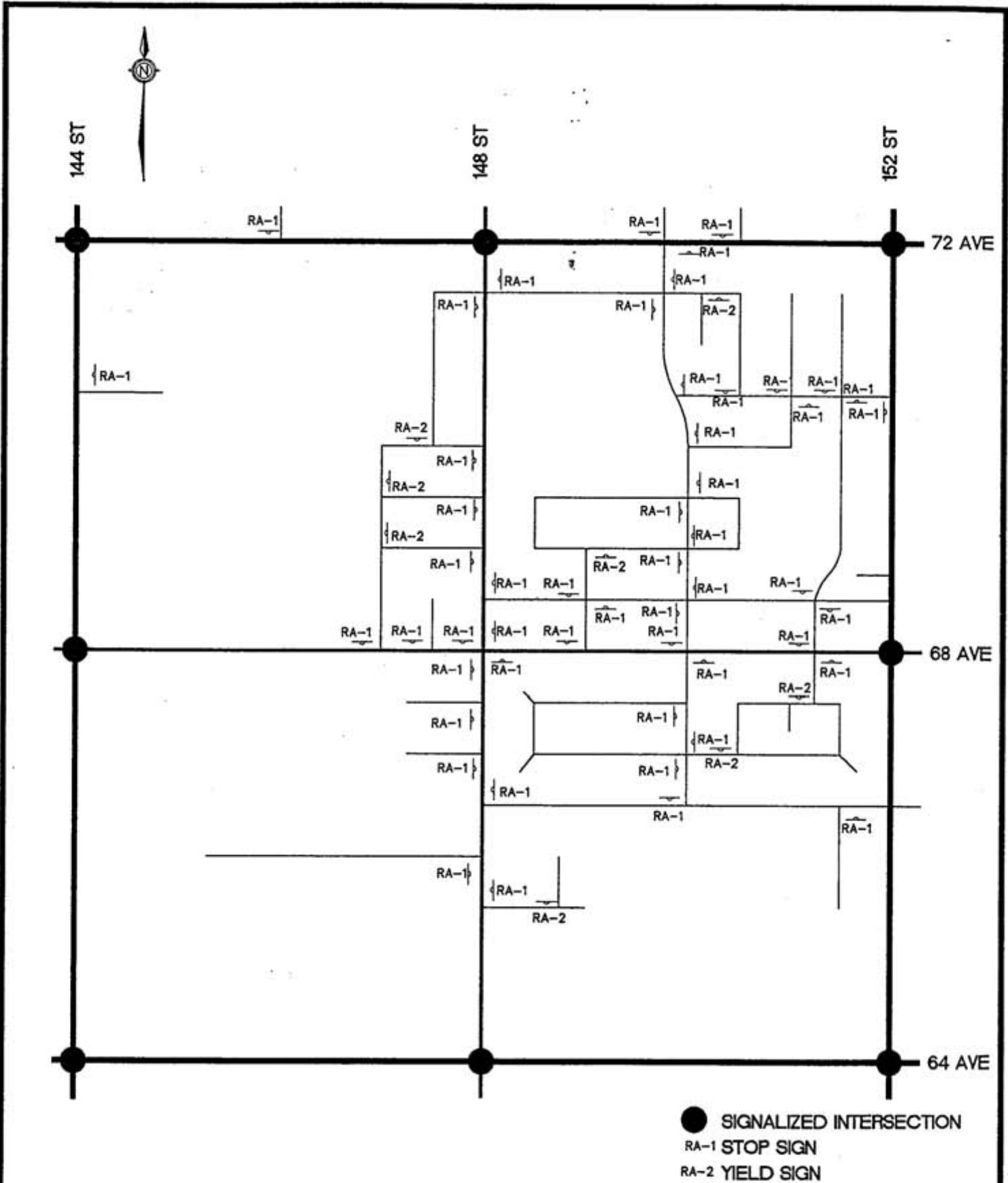
**FIGURE 1**

**PROPOSED ROAD NETWORK**  
**East Newton, South Neighbourhood**  
 City of Surrey



April 1997





**INTERSECTION CONTROL DRAWING**



**UMA Engineering Ltd.**  
Engineers & Planners

British Columbia Alberta Saskatchewan  
 Manitoba Ontario Northwest Territories  
 New Brunswick P.E.I. Nova Scotia  
 3030 Gilmore Division, Burnaby, B.C.  
 V5G 3B4 Telephone: 436-5311

**East Newton NCP**  
CITY OF SURREY

96/08/08

NTS

FIGURE 2



144 ST

148 ST

152 ST

72 AVE

68 AVE

64 AVE




PARKING ON WEST SIDE OF ROAD

PARKING ON NORTH SIDE OF ROAD

PARKING ON NORTH SIDE OF ROAD

PARKING ON EAST SIDE OF ROAD

### PARKING RESTRICTION PLAN

-  NO ON-STREET PARKING
-  ON-STREET PARKING ONE SIDE
-  NO PARKING RESTRICTIONS



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Manitoba Ontario Northwest Territories  
New Brunswick P.E.I. Nova Scotia

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East Newton NCP  
CITY OF SURREY

96/08/08

NTS

FIGURE 3



144 ST

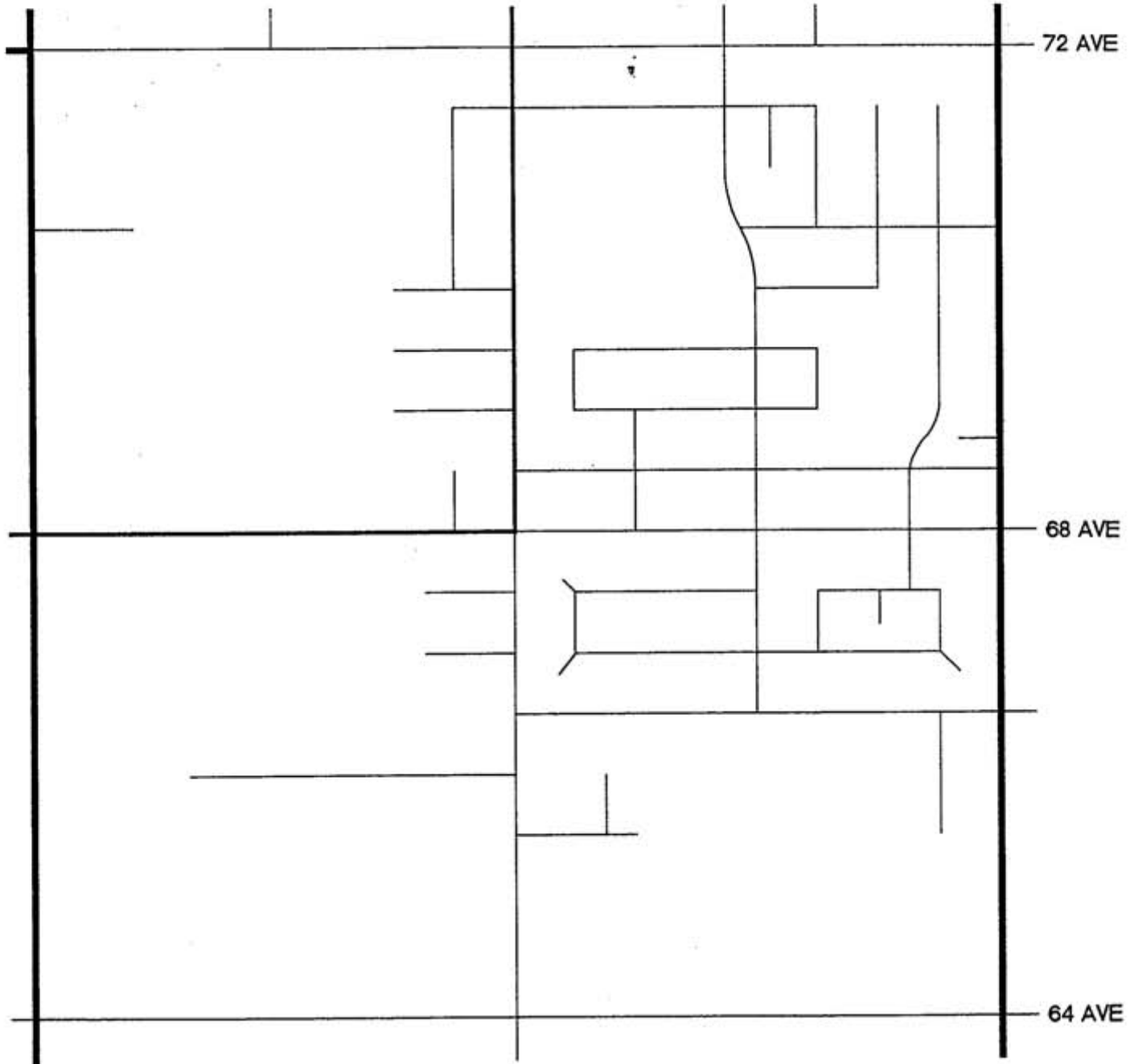
148 ST

152 ST

72 AVE

68 AVE

64 AVE



- EXISTING BC TRANSIT ROUTE
- PROPOSED BC TRANSIT ROUTE
- NO TRANSIT ROUTE PLANNED

### TRANSIT PLAN DRAWING



**UMA Engineering Ltd.**  
Engineers & Planners

British Columbia Alberta Saskatchewan  
Manitoba Ontario Northwest Territories  
New Brunswick P.E.I. Nova Scotia

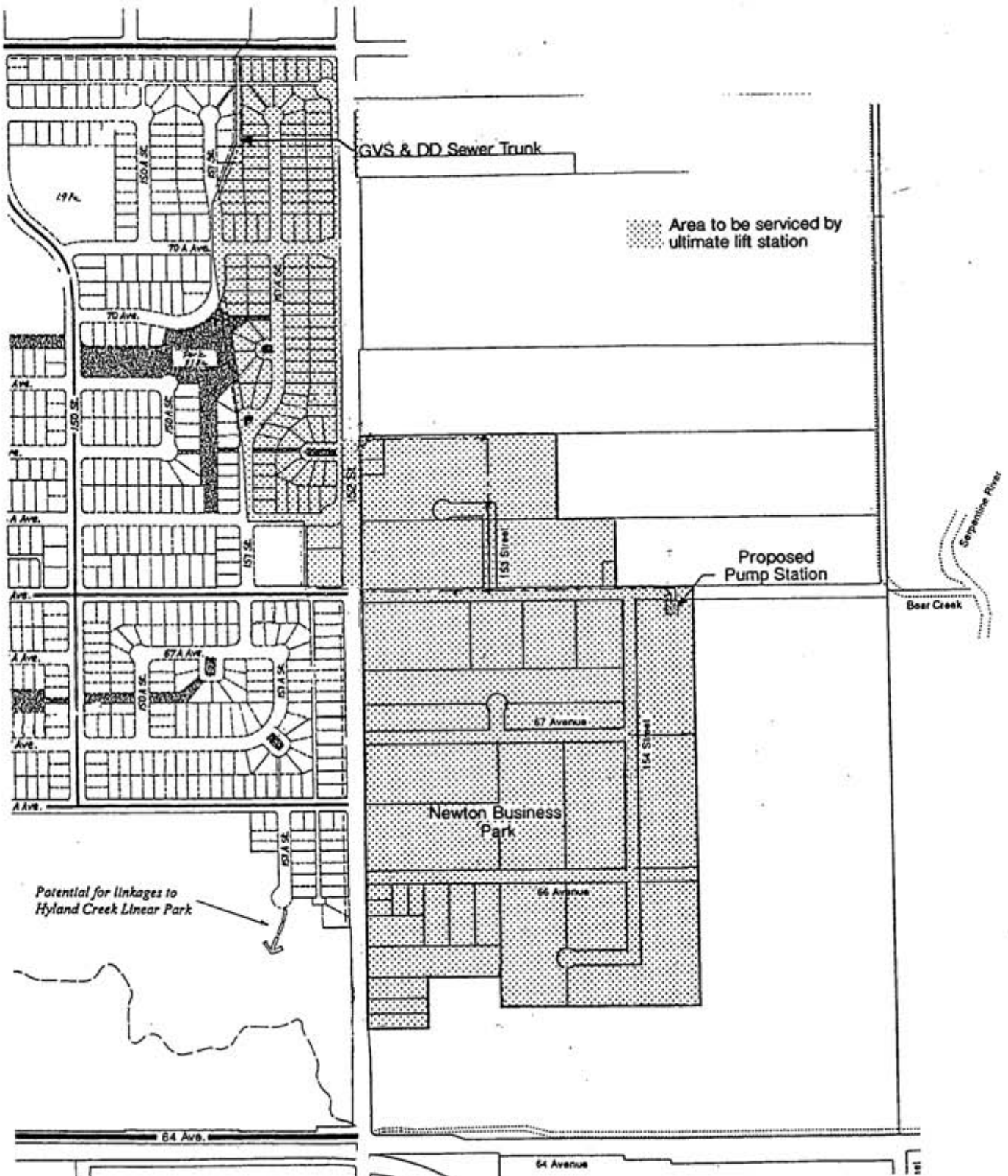
3030 Gilmore Division, Burnaby, B.C.  
V5G 3B4 Telephone: 438-5311

**East Newton NCP**  
CITY OF SURREY

95/12/15

NTS

FIGURE 4



East Newton Neighbourhood Concept Plan  
SOUTH NEIGHBOURHOOD

Figure 5

ULTIMATE LIFT STATION CATCHMENT AREA



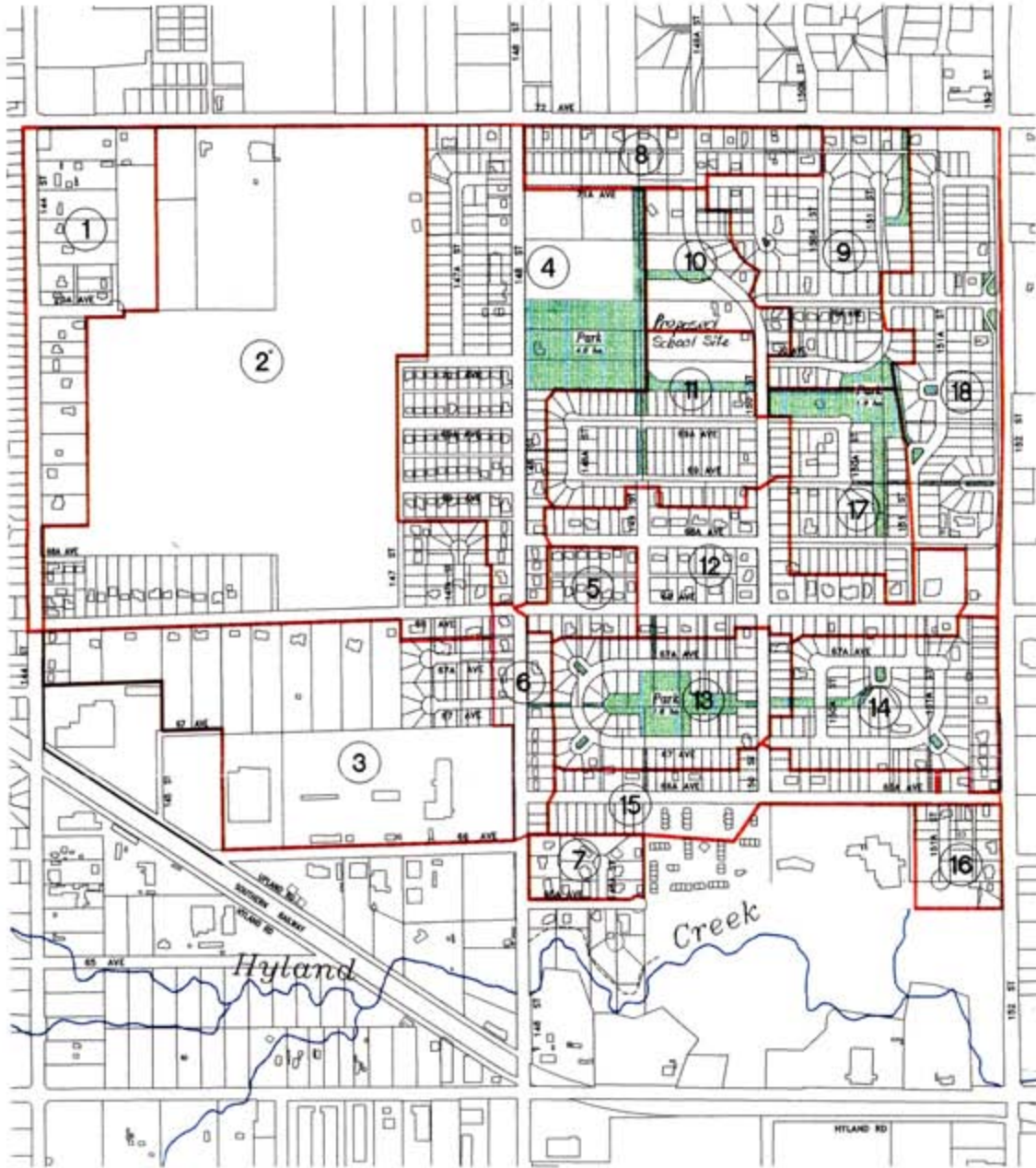


FIGURE 6

SANITARY CATCHMENT AREAS

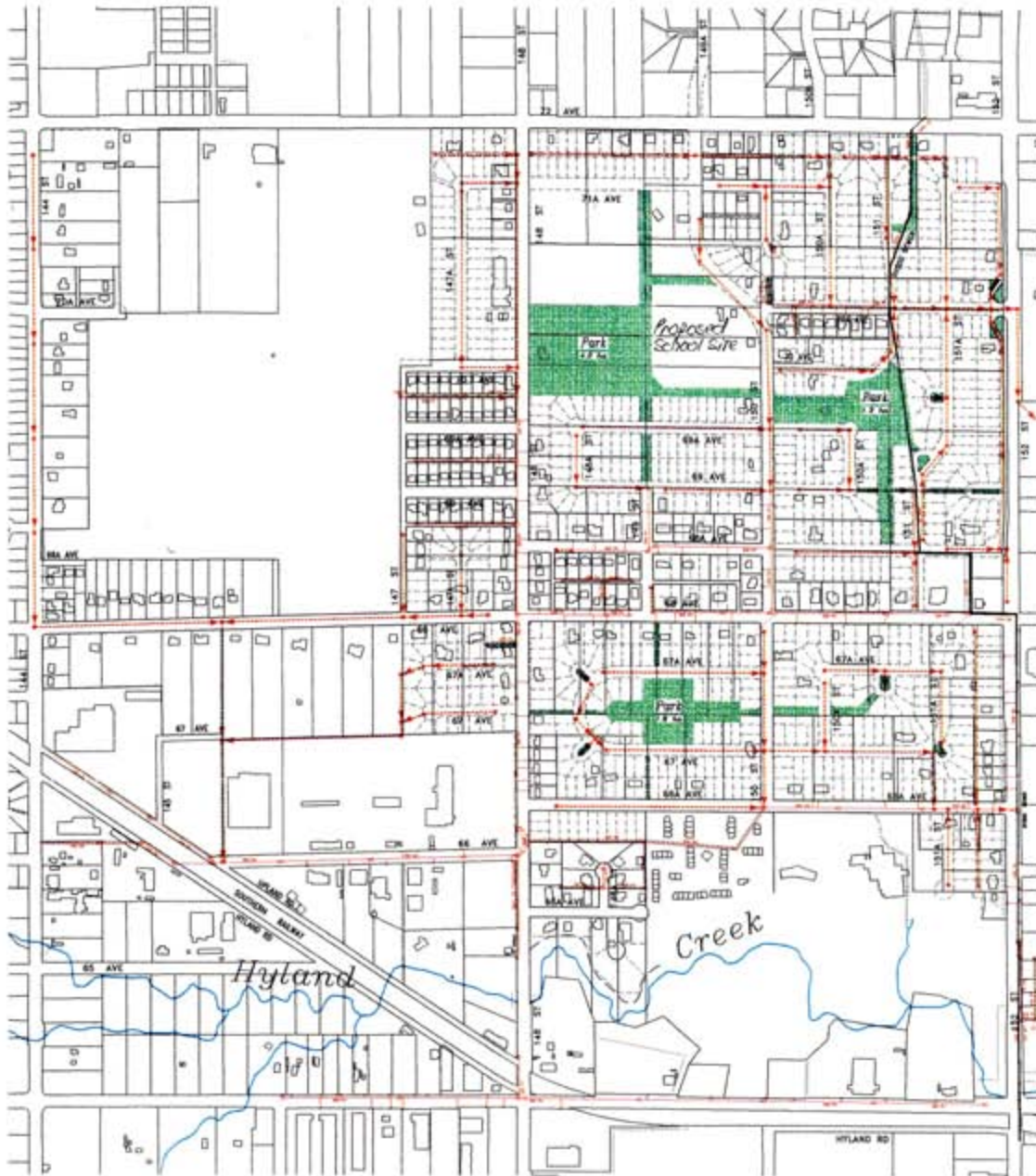
NEIGHBOURHOOD CONCEPT PLAN  
 East Newton, South Neighbourhood  
 City of Surrey



April 1997

uma





LEGEND

- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- EX. SANITARY SEWER TO BE ABANDONED
- EXISTING OVS AND DD TRUNK SEWER

PROPOSED SANITARY SEWERS

NEIGHBOURHOOD CONCEPT PLAN  
East Newton, South Neighbourhood  
City of Surrey

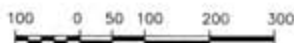
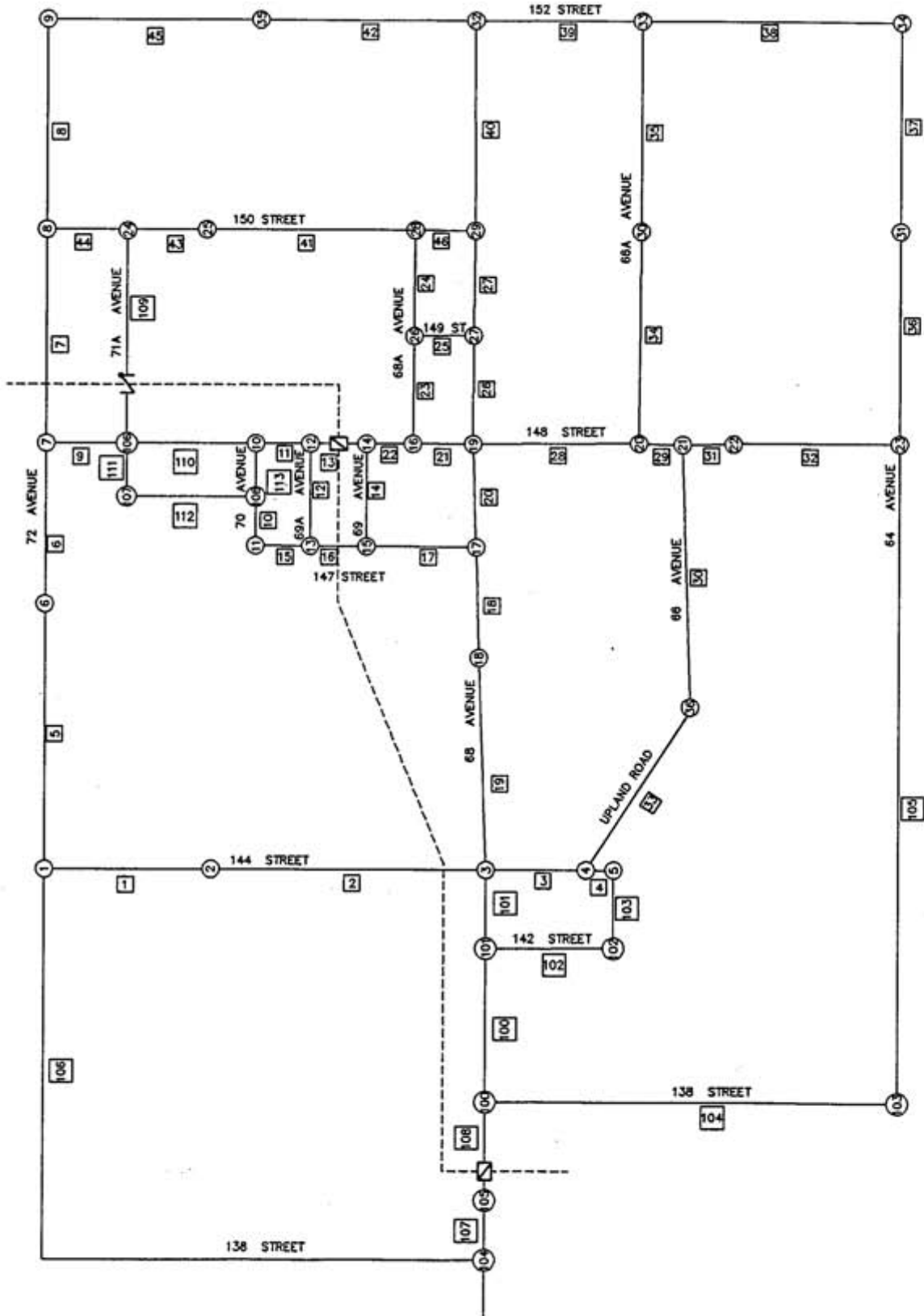


FIGURE 7



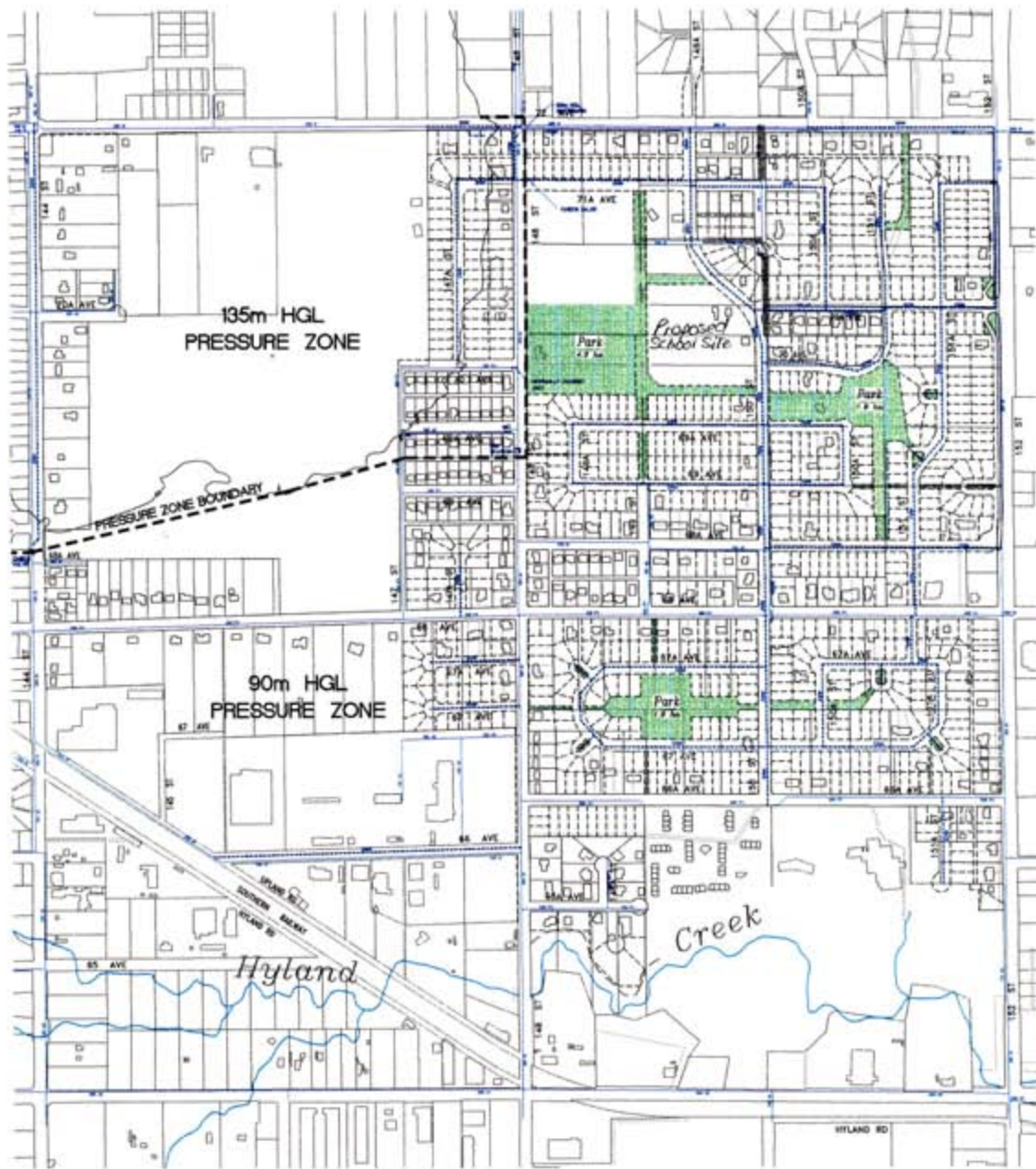
**LEGEND**

- NODE NUMBER
- PIPE NUMBER
- ◻ PRY STATION
- ∇ CHECK VALVE
- - - PRESSURE ZONE BOUNDARY

**FIGURE 8**

**WATER MODEL SCHEMATIC**

**NEIGHBOURHOOD CONCEPT PLAN**  
 East Newton, South Neighbourhood  
 City of Surrey



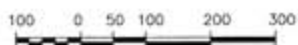
**LEGEND**

- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- EXISTING WATERMAIN TO BE ABANDONED
- PRESSURE ZONE BOUNDARY

**FIGURE 9**

**PROPOSED WATERMAINS**

**NEIGHBOURHOOD CONCEPT PLAN**  
 East Newton, South Neighbourhood  
 City of Surrey



April 1997



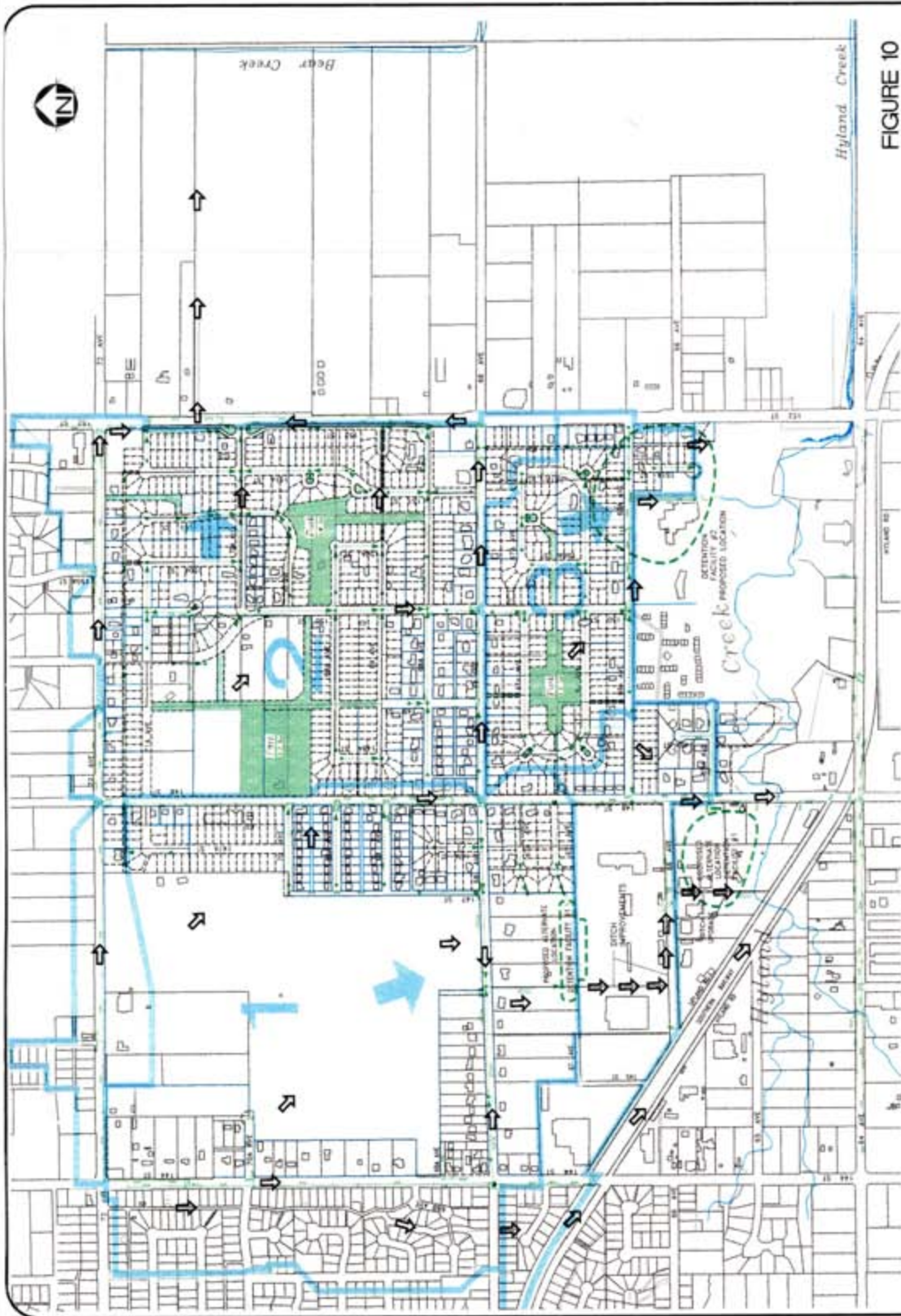
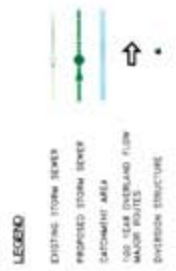


FIGURE 10

PROPOSED STORM SEWER

NEIGHBOURHOOD CONCEPT PLAN  
East Newton, South Neighbourhood  
City of Surrey



Revised October 1997



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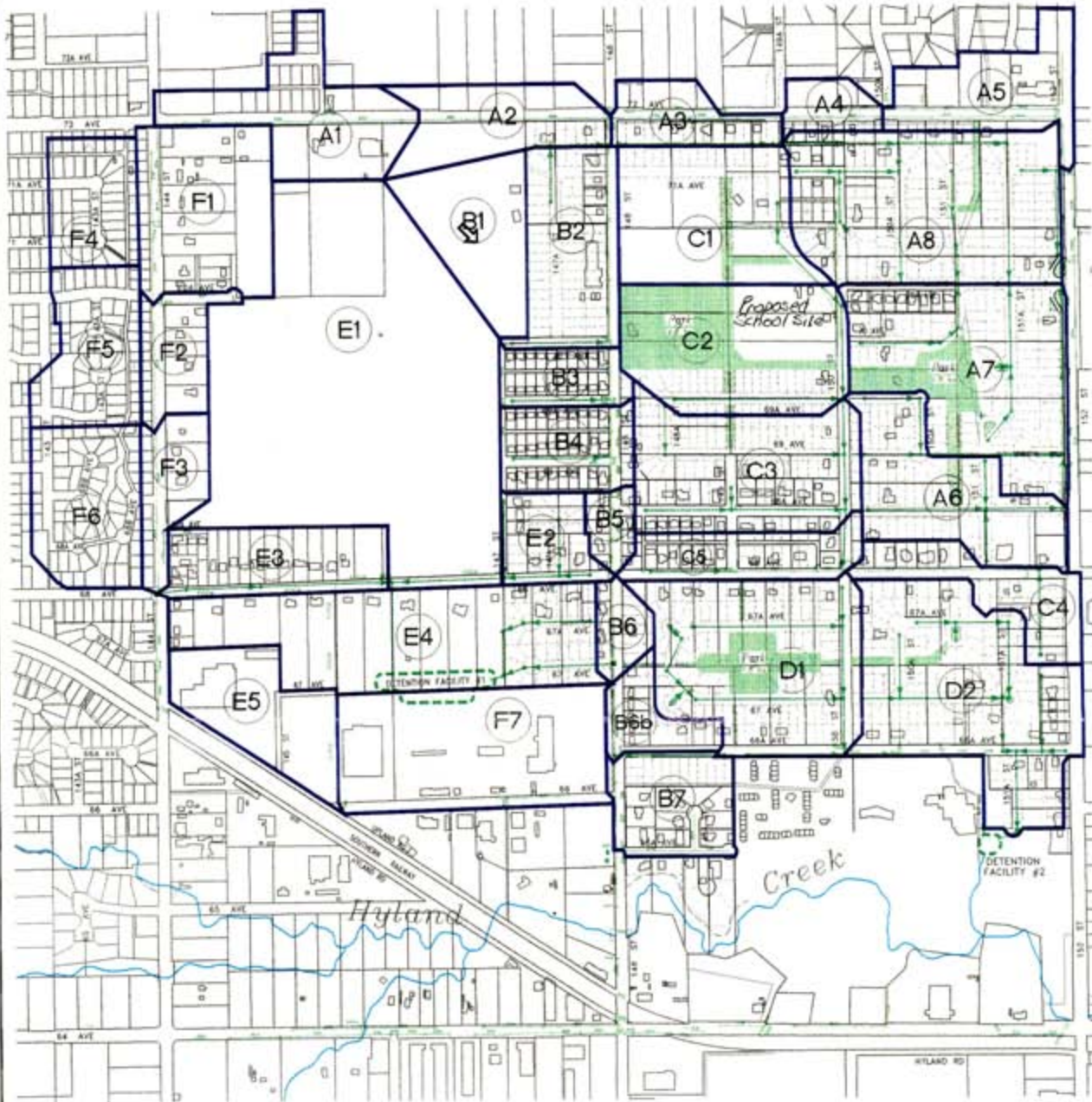


FIGURE 11

STORM CATCHMENT AREAS

NEIGHBOURHOOD CONCEPT PLAN  
 East Newton, South Neighbourhood  
 City of Surrey

LEGEND

- EXISTING STORM SEWER 
- PROPOSED STORM SEWER 
- CATCHMENT AREA 



## 5.0 FINANCIAL IMPLICATIONS OF ROADS AND UTILITIES

Section 4.0 of this report described the capital works which are required to service the NCP area. This section identifies the financial implications to construct these works.

### 5.1 FINANCING OPTIONS

It is the City of Surrey's policy that development not be subsidized by the existing tax base. Thus infrastructure improvements where they are a direct benefit to the NCP area must be financed accordingly. The City currently does not have sufficient funds to immediately upfront the cost of growth related items in the current Ten Year Servicing Plan, April 1997. If at the time of development, facilities from the current Ten Year Servicing Plan have not been constructed, the developer may construct the works and receive a DCC rebate to the maximum value of the charge paid by the developer. It should also be noted that the cost of the works may exceed the DCC rebate.

As mentioned previously, it is the responsibility of developers within the NCP area to finance the required infrastructure projects. Infrastructure included in the Ten Year Servicing Plan, and included in the DCC calculations, is eligible for DCC rebates to the extent identified in the Ten Year Servicing Plan. DCC moneys collected from this NCP area can be tracked and be credited to fund works required within the NCP. The proposed development staging allows each storm catchment area to proceed with development independent of each other. DCC contributions for road and sanitary infrastructure financing is required from the entire NCP area.

The calculation of DCC moneys generated is based on the following areas and units:

Proposed Zoning	Area	Units
CD/C-4	0.7ha (76,994 s.q.)	23,098 s.f. <sup>1</sup>
RH-G, RH	4.5ha	20 lots
RF		8.52 units
RM-10	2.8ha (20 units/ha)	56 units
RM-15	21.5ha (30 units/ha)	645 units
PA-1	1.8ha (194,000 s.f.)	58,200 s.f. <sup>1</sup>
PC - Cemetery	-	-
Elementary School	2.8ha (301,485 s.f.)	90,430 s.f. <sup>1</sup>

Note: (1) Assumption that 30% of total area will be absorbed by buildings.

Figure 12 illustrates the proposed zoning for the NCP area. This zoning was presented in the Stage One report. The DCC moneys generated are based on this proposed zoning.

In the following sections the DCC moneys generated as well as the required infrastructure costs for each utility/roadworks are discussed.

## 5.2 ROADS

DCCs for roadworks are charged for two categories: arterial roads and major collector roads. The road DCC moneys generated for the proposed zoning designations in the study area are summarized in Table 5.2.1 and Table 5.2.2.

**Table 5.2.1**  
**Arterial Road DCCs**

PROPOSED ZONING	AREA	UNITS	DCC per UNIT	DCC MONEYS GENERATED
CD/C-4	0.7 ha.(76,994 s.f.)	23,098 s.f.	\$1870/1000 s.f.	\$43,194
RH-G, RH	4.5 ha.	20 lots	\$4800/lot	\$96,000
RF		852 units	\$4800/unit	\$4,089,600
RM-10	2.8ha (20u/ha)	56 units	\$4800/unit	\$268,800
RM-15	21.5ha (30u/ha)	645 units	\$4800/unit	\$3,096,000
PA-1	1.8ha (194,000 s.f.)	58,200 s.f.	-	-
PC	-	-	-	-
Elementary School	2.8ha (301,485 s.f.)	90,430 s.f.		
<b>TOTAL</b>				<b>\$7,593,594</b>

**Table 5.2.2**  
**Major Collector Road DCCs**

PROPOSED ZONING	AREA	UNITS	DCC per UNIT	DCC MONEYS GENERATED
CD/C-4	0.7 ha.(76,994 s.f.)	23,098 s.f.	\$480/1000 s.f.	\$11,087
RH-G, RH	4.5 ha.	20 lots	\$1220/lot	\$24,400
RF		852 units	\$1220/unit	\$1,039,440
RM-10	2.8ha (20u/ha)	56 units	\$1220/unit	\$68,320
RM-15	21.5ha (30u/ha)	645 units	\$1220/unit	\$786,900
PA-1	1.8ha (194,000 s.f.)	58,200 s.f.	-	-
PC	-	-	-	-
Elementary School	2.8ha (301,485 s.f.)	90,430 s.f.		
<b>TOTAL</b>				<b>\$1,930,147</b>

*Tables 5.2.3 and 5.2.4* summarize the required infrastructure. It also identifies the DCC items. The DCC item costs for arterial roads amount to \$7,500,000. The arterial road DCCs generated at ultimate developments are \$7,593,594. The DCC items costs for major collector roads amount to \$2,530,000. The major collector road DCCs generated at ultimate development are \$1,930,147.

The developer/owner is expected to upgrade all adjacent road frontages except for arterial roads unless they are specified as a Development Coordinated Work at the time of the Servicing Agreement. For properties fronting arterial roads, it is likely that the developer will be required to construct the sidewalks and streetlights, but this would be rebated. It is recommended that all arterial road reconstruction be completely funded through DCCs. The requirement for arterial roads is not solely due to the development of the study area but is an overall requirement due in part to growth in surrounding areas to the NCP.

The Ten Year Servicing Plan identifies two major collector roads: 148 Street and 68 Avenue. The capital costs set aside for these works are for interim 8.5m wide roads. The development of the NCP study area requires 12.2 m wide collector roads. The difference in width is not a DCC item and therefore the associated costs are the developer's responsibility.

In addition, developers continue to be responsible for all costs associated with local and minor collector roads.



TABLE 5.2.3-PROPOSED ARTERIAL ROADWORKS

Item	Location	Type of Works	Current or Addition	ID # Current 10yr Plan	Amount Current Program(\$)	Add/ (Delete) to Program(\$)	Eligible for DCC Program	Refinement of DCC Program	Addition to DCC Program	Proposed Funding Method (1)	Construction by (Surrey/Dev.)	Year Requested
A1	72 Av:144-152 St.	Arterial Wide.	Addition	N/A	\$0	\$3,500,000	Yes	Yes	Yes	CW	Surrey	2004
A2	144 St:64-72 Av.	Arterial Wide.	Current	13791	\$4,000,000	\$0	Yes	No	No	CW	Surrey	2006
<b>TOTALS</b>						<b>\$4,000,000</b>						
<b>TOTAL DCC ITEMS: \$7,500,000</b>												
Note: (1) Funding Methods (Current):												
		DCC Rebate										
		Development Coordinated Works										
		Capital Works										



TABLE 5.2.4-PROPOSED MAJOR COLLECTOR ROADWORKS												
Item	Location	Type of Works	Current or Addition	ID # Current 10yr Plan	Amount Current Program(\$)	Add/ (Delete) to Program(\$)	Eligible for DCC Program	Refinement of DCC Program	Addition to DCC Program	Proposed Funding Method (1)	Construction by (Surrey/Dev.)	Year Requeste
C1	148 St./64-72 Av.	Maj. Collector Wide. 8.5 m Interim	Current	701	\$1,100,000	\$0	Yes	No	No	DCCR/CW	Dev./Surrey	2006
C2	68 Av./144-152 St.	Maj. Collector Wide. 8.5 m Interim	Current	1453, 1455	\$1,100,000	\$0	Yes	No	No	DCCR/CW	Dev./Surrey	2000
C3	144 St./68 Av.	Traffic Signal	Addition	N/A	\$0	\$160,000	Yes	Yes	Yes	DCCR/CW	Dev./Surrey	2003
C4	148 St./64 Av.	Traffic Signal	Current	4563	\$85,000	\$0	Yes	No	No	DCCR/CW	Dev./Surrey	2006
C5	152 St./68 Av.	Traffic Signal	Current	10790	\$85,000	\$0	Yes	No	No	DCCR/CW	Dev./Surrey	2003
<b>TOTALS</b>						<b>\$2,370,000</b>	<b>\$160,000</b>					
<b>TOTAL DCC ITEMS: \$2,530,000</b>												
Note: (1) Funding Methods (Current):												
		DCC Rebate										
		Development Coordinated Works			DCCR							
		Capital Works			DCW							
					CW							



### 5.3 SANITARY SEWERS

The sanitary sewer DCCs generated for the proposed zoning designations in the study area are summarized in *Table 5.3.1*.

**Table 5.3.1**  
**Sanitary Sewers DCCs**

PROPOSED ZONING	AREA	UNITS	DCC per UNIT	DCC MONEYS GENERATED
CD/C-4	0.7 ha.(76,994 s.f.)	23098 s.f.	\$290/1000 s.f.	\$6,698
RH-G, RH	4.5 ha.	20 lots	\$930/lot	\$18,600
RF		852 units	\$930/unit	\$792,360
RM-10	2.8ha (20u/ha)	56 units	\$810/unit	\$45,360
RM-15	21.5ha (30u/ha)	645 units	\$810/unit	\$522,450
PA-1	1.8ha (194,000 s.f.)	58,200 s.f.	\$290/1000 s.f.	\$16,878
PC	-	-	-	-
Elementary School	2.8ha (301,485 s.f.)	90,430 s.f.	\$290/1000 s.f.	\$26,225
			<b>TOTAL</b>	<b>\$1,428,571</b>

*Table 5.3.2* identifies the ultimate lift station as a required infrastructure. This item is in the current Ten Year Servicing Plan. An interim lift station was recommended in Section 4.2 of the report for the benefit of the NCP proponents. This will allow development to proceed in advance of the ultimate lift station. The developer's responsibility for the ultimate lift station is their payment of sanitary sewer DCCs and not any additional amounts.

If the NCP proponents wish to proceed with an interim station, they will be responsible for 100% of all costs to design and construct the interim lift station to City standards plus an allowance for 10 year maintenance. In addition, they will be responsible for their contribution towards the ultimate lift station, the forcemain, 100% of the gravity sewer connecting from the interim station location to the ultimate station location, obtaining a ROW for the gravity sewer, and all costs associated with removal of the interim pump station. *Appendix B* contains cost estimates for both the interim and ultimate lift stations as well as costs for the connection to the ultimate station.

The ultimate lift station would be sized to service the entire catchment area which includes the Business Park to the east. Estimated cost of the ultimate lift station is \$1,216,000. The East Newton NCP contribution to this ultimate station is approximately 11.32%. Therefore the costs attributable to the NCP is \$137,651. The DCCs generated for sanitary sewers is \$1,428,571, which defrays the cost of the ultimate station.

TABLE 5.3.2-PROPOSED SANITARY SEWER WORKS												
Item	Location	Type of Works	Current or Addition	ID # Current 10yr Plan	Amount Current Program(\$)	Add/ (Delete) to Program(\$)	Eligible for DCC Program	Refinement of DCC Program	Addition to DCC Program	Proposed Funding Method (1)	Construction by (Surrey/Dev.)	Year Requested
S1	154 St./67 Av.	Sanitary Lift Station	Current	10346	\$1,865,000	-\$649,000	Yes	No	No	CW	Surrey	2006
	<b>TOTALS</b>				<b>\$1,865,000</b>	<b>-\$649,000</b>						
	<b>TOTAL FOR DCC ITEMS : \$1,216,000</b>											
	Note: (1) Funding Methods (Current):											
		DCC Rebate										
		Development Coordinated Works										
		Capital Works										

It is recommended that if the NCP proponents wish to proceed with the interim pump station, they must upfront moneys for ten years maintenance, costs for removal of the interim pump station, costs for the gravity sewer connecting to the ultimate pump station and be responsible for acquiring a ROW for the gravity sewer. Estimated costs can be found in Appendix B.

## 5.4 WATERMAINS

The water DCCs generated for the proposed zoning designations in the study area are summarized in *Table 5.4.1*.

**Table 5.4.1**  
**Water DCCs**

PROPOSED ZONING	AREA	UNITS	DCC per UNIT	DCC MONEYS GENERATED
CD/C-4	0.7 ha.(76,994 s.f.)	23,098 s.f.	\$330/1000 s.f.	\$7,622
RH-G, RH	4.5 ha.	20 lots	\$1070/lot	\$21,400
RF		852 units	\$1070/unit	\$911,640
RM-10	2.8ha (20u/ha)	56 units	\$940/unit	\$52,640
RM-15	21.5ha (30u/ha)	645 units	\$940/unit	\$606,300
PA-1	1.8ha (194,000 s.f.)	58,200 s.f.	\$330/1000 s.f.	\$19,206
PC		-	-	-
Elementary School	2.8ha (301,485 s.f.)	90,430 s.f.	\$330/1000 s.f.	\$29,842
<b>TOTAL</b>				<b>\$1,648,650</b>

*Table 5.4.2* summarizes the required water works. The accumulated costs of the DCC rebatable items is \$422,000. The water DCCs generated at ultimate development are \$1,648,650. Therefore, sufficient DCC moneys are generated to defray the costs. As discussed in Section 4.3 of the report, the PRV station and the main required on 72 Avenue are overall system requirements which are not required until ultimate development.

TABLE 5.4.2-PROPOSED WATER WORKS

Item	Location	Type of Works	Current or Addition	ID # Current 10yr Plan	Amount Current Program(\$)	Add/ (Delete) to Program(\$)	Eligible for DCC Program	Amount DCC Rebateable	Refinemen of DCC Program	Addition to DCC Program	Proposed Funding Method (1)	Construction by (Surrey/Dev.)	Year Requested
W1	70 Av./148 St.	PRV Station	Current	13927	\$60,000	\$0	Yes	\$60,000	No	No	CW	Surrey	2003
W2	72 Av.:147-148 St.	300mm main	Current	10665	\$65,000	\$0	Yes	\$26,000	No	No	CW	Surrey	2004
W3	72 Av.:150-152 St.	300mm main	Current	2450	\$168,000	\$0	Yes	\$67,000	No	No	DCCR	Developer	2003
W4	144 St:68-72 Av.	300mm main	Current	2452	\$484,000	\$0	Yes	\$194,000	No	No	DCCR	Developer	2004
W5	152 St.:70A-72 Av.	300mm main	Current	2454	\$121,000	\$0	Yes	\$48,000	No	No	DCCR	Developer	2002
	144A St.:70A -North	Replace main	Current	659	\$38,000	\$0	Yes	\$6,000	No	No	CW	Developer	2005
	70A Av.:144-144A St.	Replace main	Current	1478	\$38,000	\$0	Yes	\$6,000	No	No	CW	Developer	2004
	70A Av.:150 St-East	Replace main	Current	1479	\$69,000	\$0	Yes	\$10,000	No	No	CW	Developer	2000
	71A Av.:150 St-West	Replace main	Current	1490	\$34,000	\$0	Yes	\$5,000	No	No	CW	Developer	2002
	<b>TOTALS</b>				<b>\$1,077,000</b>	<b>\$0</b>		<b>\$422,000</b>					
	<b>TOTAL DCC REBATEABLE ITEMS:\$422,000</b>												
	Note: (1) Funding Methods (Current):												
		DCC Rebate											
		Development Coordinated Works											
		Capital Works											



## 5.5 STORM SEWERS

The generated drainage and stormwater detention DCCs for the proposed zoning designations in the study area are summarized in *Table 5.5.1*.

**Table 5.5.1**  
**Drainage & Stormwater Detention DCCs**

PROPOSED ZONING	AREA	UNITS	DCC per UNIT	DCC MONEYS GENERATED
CD/C-4	0.7 ha.(76,994 s.f.)	23098 s.f.	\$830/1000 s.f.	\$19,171
RH-G, RH	4.5 ha.	20 lots	\$3390/lot	\$67,800
RF		852 units	\$2120/unit	\$1,806,240
RM-10	2.8ha (20u/ha)	56 units	\$1140/unit	\$63,840
RM-15	21.5ha (30u/ha)	645 units	\$1140/unit	\$735,300
PA-1	1.8ha (194,000 s.f.)	58,200 s.f.	\$830/1000 s.f.	\$48,306
PC	-	-	-	-
Elementary School	2.8ha (301,485 s.f.)	90,430 s.f.	\$830/1000 s.f.	\$75,057
<b>TOTAL</b>				<b>\$2,815,714</b>

*Table 5.5.2* summarizes the required storm drainage capital works.

Each catchment area must provide an ultimate drainage solution (detention facility or outfall) prior to any development being allowed to proceed within the specific catchment area. The developers will provide the method for the acquisition and funding for the detention facilities required to service their particular catchment area. This approach allows catchment areas within the NCP, that have secured a drainage solution, to proceed.

The construction of the proposed detention facilities require a significant amount of money. The City does not have sufficient funds to immediately upfront the cost. In order to allow development to proceed it is recommended that interim detention facilities be allowed, once the land acquisition for the ultimate solution has been achieved. The use of interim ponds, serving over two hectares each, is an interim solution while funds are accumulating to pay for the detention facilities. For example, it may be possible to stage the construction of Detention Facility #1 by constructing a portion of the facility depending on the extent of upstream development. The NCP proponents will be responsible for the costs of construction, maintenance and eventual removal of the interim ponds. The possible use of interim detention facilities will only be acceptable if an ultimate drainage solution within a specific catchment area has been provided and accepted by the City.

TABLE 5.5.2-PROPOSED STORM SEWER WORKS													
Item No.	Location	Type of Works	Current or Addition	ID #	Amount Current Program(\$)	Add/ (Delete) to Program(\$)	Eligible for DCC Program	Refinement of DCC Program	Addition to DCC Program	Proposed Funding Method (1)	Construction by (Surrey/Dev.)	Year Requeste	
D1	144 St/68 Ave.	Diversion Structure	Addition	N/A	\$ -	\$ 15,000	Yes	Yes	Yes	DCCR	Dev./Surrey	2004	
D2	68 Ave:144-146A St.	600mm sewer	Addition	N/A	\$ -	\$ 228,000	Yes	Yes	Yes	DCCR	Developer	2004	
D3	146A St:68-67 Ave	750mm sewer	Current	9763	\$ 220,000	\$ 74,650	Yes	Yes	No	DCCR	Developer	2004	
D4	146A St:67-66 Ave.	Ditch Improvement	Addition	N/A	\$ -	\$ 130,000	Yes	Yes	Yes	DCCR	Developer	2005	
D5	67 Ave/146A St.	Detention Facility 1	Current	13755	\$1,440,000	\$ 32,000	Yes	Yes	Yes	DCCR	Dev./Surrey	2004	
D6	66 Ave:146A-147 St	Ditch Maintenance	Addition	N/A	\$ -	\$ 20,000	Yes	Yes	Yes	DCCR	Developer	2005	
D7	147 St:66-Hyland	1050mm sewer	Addition	N/A	\$ -	\$ 97,200	Yes	Yes	Yes	DCCR	Dev./Surrey	2005	
D8	148 St/67 Ave	Diversion Structure	Addition	N/A	\$ -	\$ 15,000	Yes	Yes	Yes	DCCR	Dev./Surrey	2004	
D9	67 Ave:147-148 St.	600mm sewer	Current	11020	\$ 220,000	\$ 77,500	Yes	Yes	No	DCCR	Developer	2004	
D10	68A Ave:150-152 St.	600mm sewer	Current	13748	\$ 160,000	\$ 62,300	Yes	Yes	No	DCCR	Developer	2000	
D11	71 Avenue Ditch	Floodboxes, dyke,land	Current	13745	\$ 290,000	\$ 69,625	Yes	Yes	No	DCCR	Dev./Surrey	1999	
D12	152 A:68A -71Ave Ditch	600mm sewer	Current	13750	\$ 260,000	\$ 3,500	Yes	Yes	No	DCCR	Developer	2000	
D13	151A St/65 Ave.	Detention Facility 2	Current	13754	\$ 300,000	\$ 2,000	Yes	Yes	No	DCCR	Dev./Surrey	1998	
D14	151 St:66A-Detention 2	600mm sewer	Addition	N/A	\$ -	\$ 216,000	Yes	Yes	Yes	DCCR	Developer	1998	
D15	151 St/65 A Ave.	Diversion Structure	Addition	N/A	\$ -	\$ 10,000	Yes	Yes	Yes	DCCR	Dev./Surrey	1998	
	70A Ave:150-152 St.	400mm trunk	Current	13749	\$ 200,000	\$ 200,000	No	Yes	No				
<b>TOTALS</b>						<b>\$3,090,000</b>	<b>\$ 541,475</b>						
<b>TOTAL FOR DCC ITEMS: \$3,631,475</b>													
Note: (1) Funding Methods (Current):													
		DCC Rebate											
		Development Coordinated Works											
		Capital Works											





*Figure 10* shows the general location of the ultimate detention facilities. The ultimate location must be protected from development. Two alternate locations are shown for Detention Facility #1.

The location for Detention Facility #2 has been shown within the NCP boundary. The precise location will have to be worked out once the landowners and developers in the vicinity of 66A Avenue reach agreement regarding a suitable location. The location must be approved by the City.

Section 4.4.3 B of this report summarizes the study findings for the drainage area east of 152 Street. It is recommended that a new floodbox be installed on the 71 Avenue ditch, that the 71 Avenue dyke be raised and that a 41m right of way be provided for the 71 Avenue ditch. These works have been included in *Table 5.5.2*.

Capital Improvements that are required to the 71 Avenue ditch, east of 152 Street must be undertaken prior to development within the related catchment area.

An ultimate development "deficit" of \$815,761 (Generated DCCs - Capital Works) is projected for the required drainage improvements. The overall deficiency in drainage DCCs will be made-up by the City. This will happen when excess DCC drainage funds are available and the specific work is deemed a priority for the City.

## **5.6 INFRASTRUCTURE SUMMARY**

In the precedent sections, proposed works have been identified as DCC items. *Table 5.6.1* summarizes these items. *Figure 13* illustrates the location of these items.

Besides the infrastructure works identified, a number of recommendations can be found in the preceding sections. *Table 5.6.2* provides a summary of these recommendations.

**Table 5.6.1  
DCC Items**

<b>Item</b>	<b>Location</b>	<b>Type of Works</b>
<b>Proposed Arterial Roadworks</b>		
A1	72 Avenue: 144-152 Street	Arterial Wide
A2	144 Street: 64-72 Avenue	Arterial Wide
<b>Proposed Major Collector Roadworks</b>		
C1	148 Street: 64-72 Avenue	Major Collector Wide - 8.5m Interim
C2	68 Avenue: 144-152 Street	Major Collector Wide - 8.5m Interim
C3	144 Street/68 Avenue	Traffic Signal
C4	148 Street/64 Avenue	Traffic Signal
C5	152 Street/68 Avenue	Traffic Signal
<b>Proposed Sanitary Works</b>		
S1	155 Street/68 Avenue	Sanitary Lift Station
<b>Proposed Water Works</b>		
W1	70 Avenue/148 Street	PRV Station
W2	72 Avenue:147-148 Street	300mm main
W3	72 Avenue: 150-152 Street	300mm main
W4	144 Street: 68-72 Avenue	300mm main
W5	152 Street: 70A-72 Avenue	300mm main
<b>Proposed Storm Works</b>		
D1	144 Street/68 Avenue	Diversion Structure
D2	68 Avenue:144-146A Street	600mm sewer
D3	146A Street:68-67 Avenue	750mm sewer
D4	146A Street:67-66 Avenue	Ditch Improvement
D5	67 Avenue:146A Street	Detention Facility #1
D6	66 Avenue:146A-147 Street	Ditch Maintenance
D7	147 Street:66-Hyland	1050mm sewer
D8	148 Street/67 Avenue	Diversion Structure
D9	67 Avenue:147-148 Street	600mm sewer
D10	68A Avenue:150-152 Street	600mm sewer
D11	71 Avenue Ditch	Floodboxes, dyke, land
D12	152A:68A-71 Avenue Ditch	600mm sewer
D13	151A Street/65 Avenue	Detention Facility 2
D14	151 Street:66A - Detention 2	600mm sewer
D15	151 Street/65A Avenue	Diversion Structure

**Table 5.6.2  
Summary of Recommendations**

	<b>Report Section</b>
1. Recommend that an interim sanitary pump station be permitted for the benefit of the NCP proponents in the area between 152 Street and the GVS&DD sewer.	4.2
2. Recommend that if NCP proponents wish to proceed with interim sanitary pump station, they must upfront moneys for 10 year maintenance, removal of interim pump station and costs for the gravity sewer connecting to the ultimate pump station. They will also be responsible for obtaining a ROW for the gravity sewer.	5.4
3. In order to allow development to proceed, it is recommended that interim detention facilities be allowed. This will only be acceptable if an ultimate drainage solution within the specific catchment area has been provided and accepted by the City.	5.5

## **5.7 DEVELOPMENT STAGING**

Consideration has been given to the desirability of staging development to allow for progressive phasing of utility services as well as accumulation of sufficient revenues to develop the required infrastructure. *Figure 14* illustrates a staging plan which allows each storm catchment area to proceed with development independent of each other. *Tables 5.7.1 to 5.7.5* illustrate the infrastructure financing which follows the proposed staging plan. DCC contribution for road and sanitary infrastructure financing is required from the entire NCP area. *Table 5.7.6* summarizes the cumulative balances after each stage. In stages where the accumulative balance is a deficit, it is proposed that a development works agreement be utilized to make up the shortfall.

It should be noted that this staging plan represents only one option which allows the NCP area to pay its infrastructure requirements as it develops, other options could be formulated to achieve similar results. The following sections summarize the proposed stages.

**TABLE 5.7.1-ARTERIAL ROADWORKS INFRASTRUCTURE PHASING & FINANCING**

Development Stage	Year	Zoning	Units & Rates	DCC Monies	Construction	Capital Cost	Cumulative Balance
C3A	1997	RH,RH-G	20 lots	\$ 96,000			\$96,000
C3B	1997	RF	21 units	\$ 100,800			\$196,800
C3B	1997-98	RF	250 units	\$1,200,000			\$1,396,800
C2A	1998-99	CD/C-4	23,098 s.f	\$ 43,194			\$1,439,994
		RF	114 units	\$ 547,200			\$1,987,194
C2B	2000-01	RF	188 units	\$ 902,400			\$2,889,594
C2C	2002-03	RF	143 units	\$ 686,400			\$3,575,994
		RM-10	56 units	\$ 268,800			\$3,844,794
		School	90,430 s.f.	\$ -			\$3,844,794
C1A	2004-05	RF	136 units	\$ 652,800			\$4,497,594
					Item A1:		
		RM-15	8.3 ha(249 units)	\$1,195,200	72 Av:Arterial widening	\$3,500,000	\$2,192,794
		PA-1	58,200 s.f.	\$ -			\$2,192,794
C1B	2005-06	RM-15	9.2 ha.(276 units)	\$1,324,800			\$3,517,594
		RM-15	4.0 ha(120 units)	\$ 576,000			\$4,093,594
					Item A2:		
					144 St:Arterial widening	\$4,000,000	\$93,594
			<b>Totals</b>	<b>\$7,593,594</b>		<b>\$7,500,000</b>	<b>\$ 93,594</b>
Notes:							
Cumulative Balance=DCC Contributions-Capital Cost							

**TABLE 5.7.2-MAJOR COLLECTOR INFRASTRUCTURE PHASING & FINANCING**

Development Stage	Year	Zoning	Units & Rates	DCC Contributions	Construction	Capital Cost	Cumulative Balance
C3A	1997	RH,RH-G	20 lots	\$24,400			\$24,400
C3B	1997	RF	21 units	\$ 25,620			\$50,020
	1997-98	RF	250 units	\$ 305,000			\$355,020
C2A	1998-99	CD/C-4	23,098 s.f.	\$ 11,087			\$366,107
		RF	114 units	\$ 139,080			\$505,187
C2B	2000-01	RF	188 units	\$ 229,360			\$734,547
C2C	2002-03	RF	143 units	\$ 174,460			\$909,007
		RM-10	56 units	\$ 68,320			\$977,327
		School	90,430 s.f.	\$ -			\$977,327
C1A	2004-05	RF	136 units	\$ 165,920			\$1,143,247
					Item C2: 68 Av:144-152 St wide.	\$1,100,000	\$43,247
		RM-15	8.3 ha(249 units)	\$ 303,780			\$347,027
					Item C5: 152 St/68 Av traffic sig.	\$85,000	\$262,027
					Item C3: 144 St/68 Av traffic sig.	\$160,000	\$102,027
		PA-1	58,200 s.f.	\$ -			\$102,027
C1B	2005-06	RM-15	9.2 ha.(276 units)	\$ 336,720			\$438,747
					Item C1: 148 St:64-72 Av wide.	\$1,100,000	-\$661,253
					Item C4: 148 St/64 Av traffic sig.	\$85,000	-\$746,253
		RM-15	4.0 ha(120 units)	\$ 146,400			-\$599,853
		<b>Totals</b>		<b>\$ 1,930,147</b>		<b>\$2,530,000</b>	<b>-\$599,853</b>
Notes:							
Cumulative Balance=DCC Contributions-Capital Cost							

**TABLE 5.7.3-SANITARY SEWERS INFRASTRUCTURE PHASING & FINANCING**

Development Stage	Year	Zoning	Units & Rates	DCC Monies	Construction	Capital Cost	Cumulative Balance
C3A	1997	RH,RH-G	20 lots	\$ 18,600			\$18,600
C3B	1997	RF	21 units	\$ 19,530			\$38,130
	1997-98	RF	250 units	\$ 232,500			\$270,630
C2A	1998-99	CD/C-4	23,098 s.f	\$ 6,698			\$277,328
		RF	114 units	\$ 106,020			\$383,348
C2B	2000-01	RF	188 units	\$ 174,840			\$558,188
C2C	2002-03	RF	143 units	\$ 132,990			\$691,178
		RM-10	56 units	\$ 45,360			\$736,538
		School	90,430 s.f.	\$ 26,225			\$762,763
C1A	2004-05	RF	136 units	\$ 126,480			\$889,243
		RM-15	8.3 ha(249 units)	\$ 201,690			\$1,090,933
		PA-1	58,200 s.f.	\$ 16,878			\$1,107,811
C1B	2005-06	RM-15	9.2 ha.(276 units)	\$ 223,560			\$1,331,371
					Item S1: Lift Station	\$ 1,216,000	\$115,371
		RM-15	4.0 ha(120 units)	\$ 97,200			\$212,571
			<b>Totals</b>	<b>\$ 1,428,571</b>		<b>\$ 1,216,000</b>	<b>\$ 212,571</b>
Notes:							
Cumulative Balance=DCC Contributions-Capital Cost							

**TABLE 5.7.4-WATER INFRASTRUCTURE PHASING & FINANCING**

Development Stage	Year	Zoning	Units & Rates	DCC Contributions	Construction	Capital Cost	Cumulative Balance
<b>Catchment Area 3</b>							
C3A	1997	RH,RH-G	20 lots	\$ 21,400			\$21,400
C3B	1997	RF	21 units	\$ 22,470			\$43,870
	1997-98	RF	250 units	\$ 267,500			\$311,370
<b>Catchment Area 3 Totals</b>				<b>\$ 311,370</b>		<b>\$0</b>	<b>\$311,370</b>
<b>Catchment Area 2</b>							
C2A	1998-99	CD/C-4	23,098 s.f.	\$ 7,622			\$7,622
		RF	114 units	\$ 121,980			\$129,602
C2B	2000-01	RF	188 units	\$ 201,160			\$330,762
C2C	2002-03	RF	143 units	\$ 153,010			\$483,772
		RM-10	56 units	\$ 52,640			\$536,412
		School	90,430 s.f.	\$ 29,842			\$566,254
					Item W5:		
					152St:70-72 Av main	\$121,000	\$445,254
					Item W3:		
					72 Ave:150-152 St.	\$168,000	\$277,254
					Item W1:		
					PRV Station	\$60,000	\$217,254
<b>Catchment Area 2 Totals</b>				<b>\$ 566,254</b>		<b>\$349,000</b>	<b>\$217,254</b>
<b>Catchment Area 1</b>							
C1A	2004-05	RF	136 units	\$ 145,520			\$145,520
		RM-15	8.3 ha(249 units)	\$ 234,060			\$379,580
					Item W2:		
					72 Av:144-148 St main	\$65,000	\$314,580
		PA-1	58,200 s.f.	\$ 19,206			\$333,786
C1B	2005-06	RM-15	9.2 ha.(276 units)	\$ 259,440			\$593,226
					Item W4:		
					144 St: 68-72 St.	\$484,000	\$109,226
		RM-15	4.0 ha(120 units)	\$ 112,800			\$222,026
<b>Catchment Area 1 Totals</b>				<b>\$ 771,026</b>		<b>\$549,000</b>	<b>\$222,026</b>
<b>Notes:</b>							
Cumulative Balance=DCC Contributions-Capital Cost							

TABLE 5.7.5-STORM INFRASTRUCTURE PHASING & FINANCING							
Development Stage	Year	Zoning	Units & Rates	DCC Monies	Construction	Capital Cost	Cumulative Balance
<b>Catchment Area 3</b>							
C3A	1997	RH,RH-G	20 lots	\$67,800			\$67,800
C3B	1997	RF	21 units	\$44,520			\$112,320
	1997-98	RF	250 units	\$530,000			\$642,320
					Item D13: Detention Facility 2	\$302,000	\$340,320
					Item D14: 151 St:68A-Detention	\$216,000	\$124,320
					Item D15: 151 St:65A Ave.	\$10,000	\$114,320
<b>Catchment Area 3 Totals</b>				<b>\$642,320</b>		<b>\$528,000</b>	<b>\$114,320</b>
<b>Catchment Area 2</b>							
C2A	1998-99	CD/C-4	23,098 s.f	\$19,171			\$19,171
		RF	114 units	\$241,680			\$260,851
					Item D11: 71 Ave Ditch/Dyke	\$359,625	-\$98,774
C2B	2000-01	RF	188 units	\$398,560			\$299,786
					Item D10: 68A Ave:150-152 St	\$222,300	\$77,486
					Item D12: 152 A St:68A -Ditch	\$256,500	-\$179,014
C2C	2002-03	RF	143 units	\$303,160			\$124,146
		RM-10	56 units	\$63,840			\$187,986
		School	90,430 s.f.	\$75,057			\$263,043
<b>Catchment Area 2 Totals</b>				<b>\$1,101,468</b>		<b>\$838,425</b>	<b>\$263,043</b>
<b>Catchment Area 1</b>							
C1A	2004-05	RF	136 units	\$288,320			\$288,320
					Item D5: Det. Fac. #1-Land	\$794,000	-\$505,680
		RM-15	8.3 ha(249 units)	\$283,860			-\$221,820
		PA-1	58,200 s.f.	\$48,306			-\$173,514
					Item D1: 144 St:68 Ave.	\$15,000	-\$188,514
					Item D2: 68 Ave:144-146A St.	\$228,000	-\$416,514
					Item D3: 146A St:66-67 Ave	\$145,350	-\$561,864
					Item D5: Detention Facility 1	\$678,000	-\$1,239,864
					Item D8: 148 St:67 Ave	\$15,000	-\$1,254,864
					Item D9: 67 Ave:147-148 St.	\$142,500	-\$1,397,364
C1B	2005-2006	RM-15	9.2 ha.(276 units)	\$314,640			-\$1,082,724
					Item D6: 66 Ave:146A-147 St.	\$20,000	-\$1,102,724
					Item D4: 146A St:67-66 Ave.	\$130,000	-\$1,232,724
		RM-15	4.0 ha(120 units)	\$136,800			-\$1,095,924
					Item D7: 147 St:68A-Hyland	\$97,200	-\$1,193,124
<b>Catchment Area 1 Totals</b>				<b>\$1,071,926</b>		<b>\$2,265,050</b>	<b>-\$1,193,124</b>
<b>Notes:</b>							
Cumulative Balance=DCC Contributions-Capital Cost							



**TABLE 5.7.6 - INFRASTRUCTURE PHASING AND FINANCE SUMMARY**

Cumulative Balance After Each Stage						
Development Stage	Year	Arterial	Maj. Collector	Sanitary	Water	Storm
C3A	1997	\$96,000	\$24,400	\$18,600	\$21,400	\$67,800
C3B	1997-98	\$1,396,800	\$355,020	\$270,630	\$311,370	\$114,320
C2A	1998-99	\$1,987,194	\$505,187	\$383,348	\$129,602	-\$98,774
C2B	2000-01	\$2,889,594	\$734,547	\$558,188	\$330,762	-\$179,014
C2C	2002-03	\$3,844,794	\$977,327	\$762,763	\$217,254	\$263,043
C1A	2004-05	\$2,192,794	\$102,027	\$1,107,811	\$333,786	-\$1,397,364
C1B	2005-06	\$93,594	-\$599,853	\$212,571	\$222,026	-\$1,193,124
<b>Cumulative Balance=DCC Contributions-Capital Cost</b>						

### **5.7.1 Stage C3A and C3B**

Stage C3 has been subdivided into two component areas. Either sub-stage can proceed independently of each other.

As discussed in previous sections of this report, the NCP proponents in this catchment area will be required to have an ultimate drainage solution, acceptable to the City, before development can proceed.

Stage C3A does not require any major infrastructure to proceed. Stage C3B requires the construction of Detention Facility #2, sewers on 151 Street and a diversion structure.

### **5.7.2 Stage C2A**

Once again, NCP proponents in this catchment area will be required to have an ultimate drainage solution, acceptable to the City, before development can proceed. Construction of storm sewers and water mains on 152A Street, 68 Avenue and 72 Avenue are required. Storm works on the 71 Avenue ditch are required before proceeding with this stage. Stage 2 can only proceed if an interim sanitary lift station is constructed. As stated previously, the NCP proponents in this area will be responsible for 100% of all costs to design and construct the interim lift station plus an allowance for 10 year maintenance. In addition they are also responsible for the costs of the gravity sewer connecting to the ultimate lift station and obtaining the ROW for the sewer.

### **5.7.3 Stage C2B**

Stage C2B may proceed after Stage C2A as sufficient funds will have accumulated to proceed with required infrastructure. Stage C2B requires the construction of storm sewers on 68A Avenue.

### **5.7.4 Stage C2C**

The PRV station (148 Street / 70 Avenue) can be constructed at this stage.

### 5.7.5 Stage C1A

Once again, NCP proponents in this catchment area will be required to have an ultimate drainage solution, acceptable to the City, before development can proceed in this catchment area.

Stage C1A requires the construction of Detention Facility #1, a diversion structure (144 Street / 68 Avenue), sewers on 68 Avenue, 146A Street and 67 Avenue. Watermains on 144 Street are also required. Roadworks on 68 Avenue may also proceed at this point of the development. At the same time, waterworks required on 72 Avenue can be constructed.

### 5.7.6 Stage C1B

Stage C1B requires the improvement of ditches along 146A Street and 66 Avenue. Construction of a sewer to Hyland Creek will also be required. At this point in the development, roadworks on 148 Street may proceed. At this stage, there is also enough moneys accumulated to proceed with the construction of the ultimate sanitary lift station at 155 Street/68 Avenue.

## 5.8 FINANCING SUMMARY

As noted previously, the staging plan represents one possible scenario. The staging plan has been completed on the assumption that no developer can upfront any moneys for the required DCC infrastructure. A developer may wish to proceed without following the staging plan. In this case, the developer will be responsible for the costs of DCC items which may be required. The developer will also be responsible for demonstrating how the financing of the entire NCP area is affected by his developing out of sequence. The option of using a latecomer's agreement or DCC rebates exists. In the case of a DCC rebate, the rebate is provided up to the amount paid by the developer but not to exceed the cost of the works.

The difference between the DCC amount to be paid and the cost of the works would still be have to be paid by the developer. Regardless of the development scenario the developer is responsible for the following:

- all local and minor collector roads;
- all required utilities not considered trunk;
- all accepted interim facilities with no DCC relief or rebate; and
- construction of end use facilities for bikes.

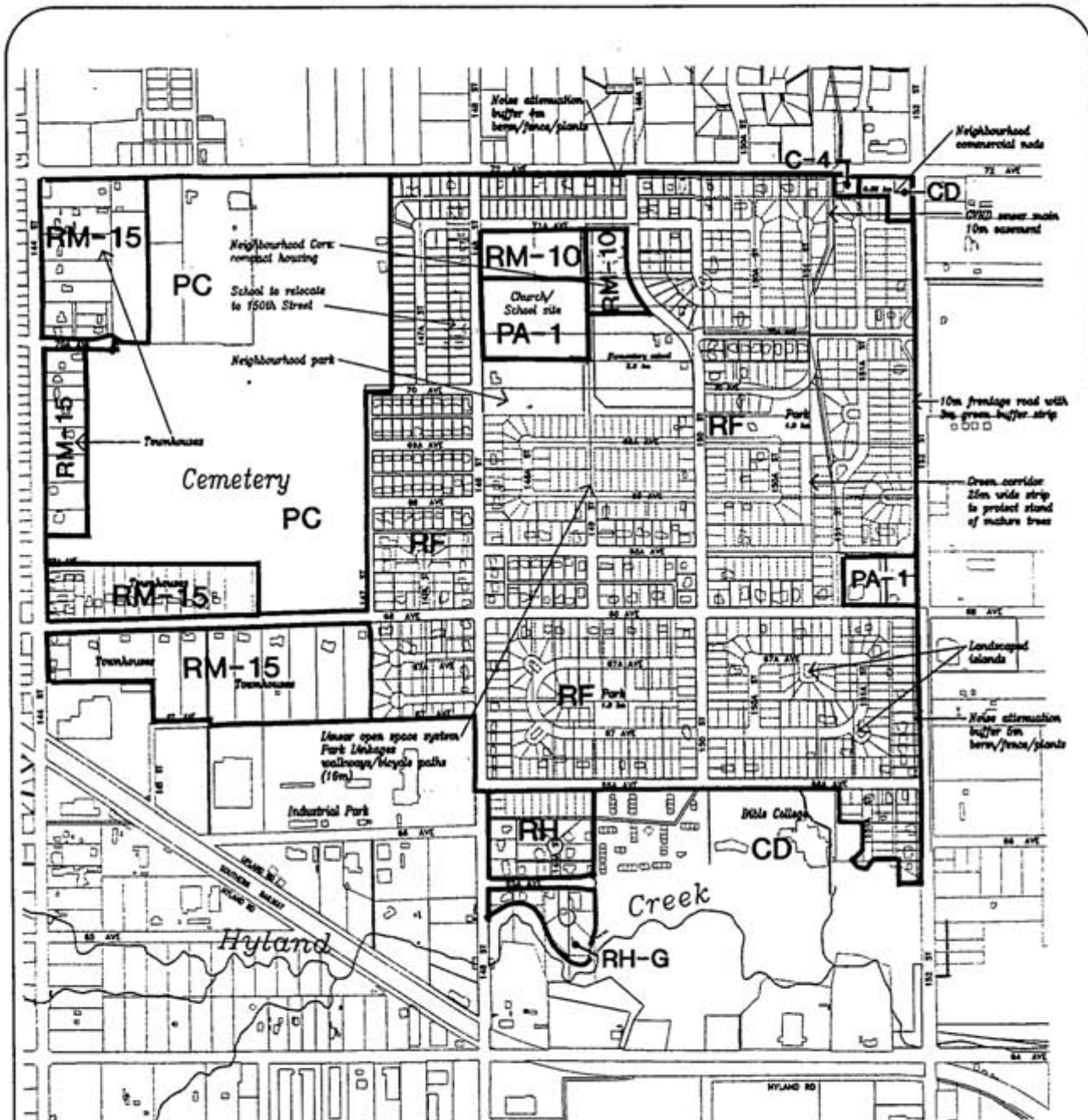
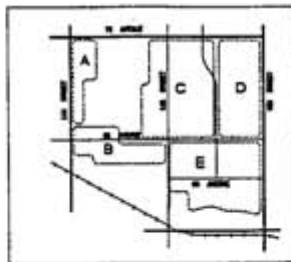
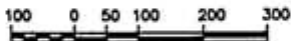


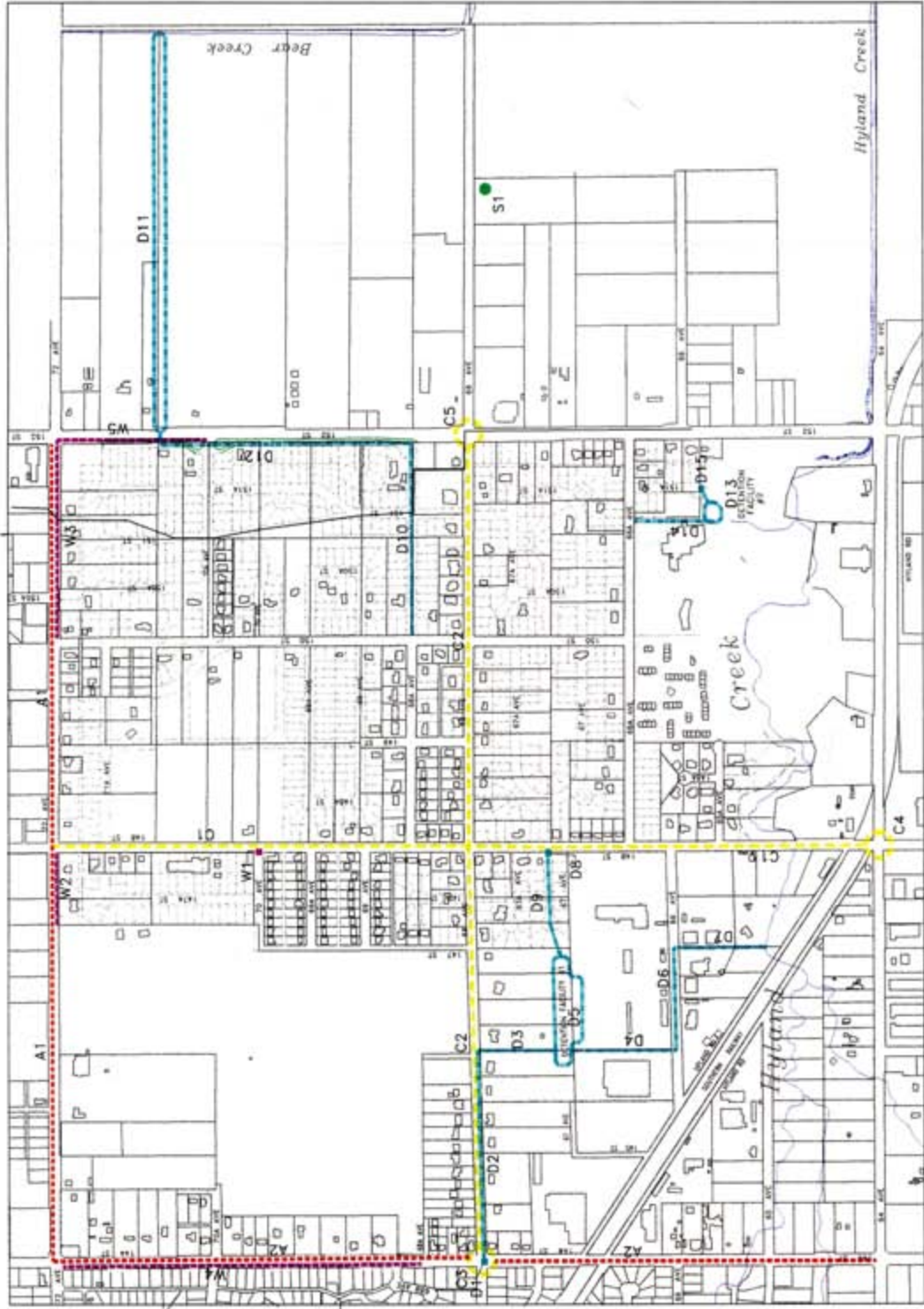
FIGURE 12

**PROPOSED ZONING**  
**NEIGHBOURHOOD CONCEPT PLAN**  
**East Newton, South Neighbourhood**  
 City of Surrey



N.C.P. SUBAREAS





**FIGURE 13**

**DCC ITEMS**

**NEIGHBOURHOOD CONCEPT PLAN**  
 East Newton, South Neighbourhood  
 City of Surrey

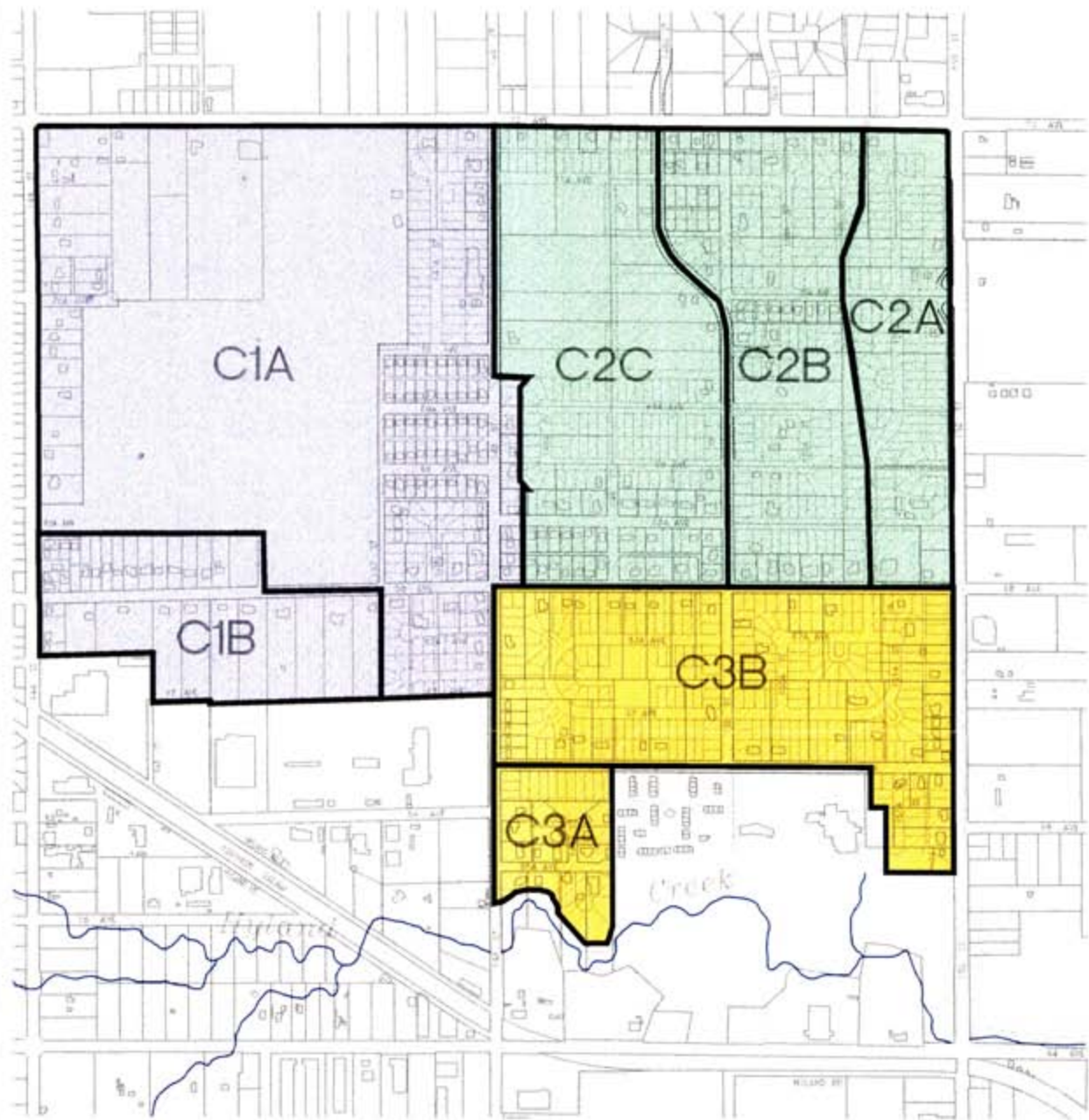
- D DRAINAGE ITEM
- W WATER ITEM
- S SANITARY ITEM
- C MAJOR COLLECTOR ITEM
- A ARTERIAL ITEM

NOTE: Table 5.61 lists the works corresponding to the item numbers shown on this map.



August 1997





- Catchment Area 1
- Catchment Area 2
- Catchment Area 3



N.C.P. SUB-AREAS



**FIGURE 14**  
**DEVELOPMENT STAGING**  
**NEIGHBOURHOOD CONCEPT PLAN**  
**East Newton, South Neighbourhood**  
 City of Surrey

Revised September 1997



## 6.0 AMENITY CONTRIBUTIONS

### 6.1 AMENITY COSTS

The following is an indication of proposed amenity cost contributions that may be expected from owners in the East Newton South Neighbourhood. These contributions would be paid upon development (rezoning or subdivision). The actual cost per unit will also depend on the ultimate projected number of new housing units. Indicated costs reflect assumptions on density and lot yield.

#### *Park and Open Space*

The amenity contribution for park and open space is determined by the projected development cost of proposed parks in the neighbourhood. These costs are then divided by the total number of projected housing units to arrive at a per unit park development contribution.

Proposed parks in the NCP area are established as follows:

Based on following principal park space in neighbourhood:

- 3.9ha (9.6ac.) active park area near school site;
- 1.6ha (4ac.) ha passive park (treed area near 152nd);
- 1.6ha (4ac.) park playground at the south end of the neighbourhood at 67th Avenue; and
- walkway and trail system.

The City of Surrey Parks and Recreation Department has compiled an estimate of park development costs associated with park and open space in the East Newton South Neighbourhood. Proposed amenities as provided by this department are as follows (the detailed cost estimate is included in the Appendix):

- park development (at the proposed school site) including a soccer field, baseball diamond, benches and tables, bike rack, landscaping and signage;
- neighbourhood parks including benches and tables, a playground and signage;
- walkways, including fencing and a bike baffle (walkways are expected to be 2 metres or wider in width); and
- miscellaneous development including arborist services and public consultation.

The total estimated cost amounts to \$1,005,409. Assuming 1525 new units in the area this will result in an amenity contribution of \$659 per unit.

### ***Firehall***

An amenity study undertaken by the city has determined that a standard contribution be established to provide capital for the upgrading of fire facilities. The total contribution has been set at \$216.00 per unit, regardless of the type of housing unit.

### ***Policing***

For police upgrading, as a result of the added population an amenity contribution of \$50.00 per housing unit is established.

### ***Library***

A standard contribution amount has been established for library upgrading. This is related primarily to providing for additions to the book collection, and reflects demand placed on library facilities through the added population. A charge of \$112.50 applies for library improvement, and reflects a per unit rate.

A summary of total amenity contributions is provided in Table 6.1.1, which follows.



**Table 6.1.1  
Amenity Contribution Summary**

ITEM	NATURE OF IMPROVEMENT	NCP PER UNIT CONTRIBUTION
<b>Parks and Recreation</b>	<ul style="list-style-type: none"> <li>• sportsfield</li> <li>• playground</li> <li>• passive area improvement (trails)</li> </ul>	\$659 per housing unit
<b>Fire Protection</b>	<ul style="list-style-type: none"> <li>• building - capital cost share</li> <li>• aerial facility</li> </ul>	\$216.00 per housing unit
<b>Library</b>	<ul style="list-style-type: none"> <li>• contribution towards collection acquisition</li> </ul>	\$112.50 per unit
<b>Policing</b>	<ul style="list-style-type: none"> <li>• added policing as a result of increased population</li> </ul>	\$50.00 per unit
<b>Total Amenity Contribution</b>		\$1037.50 per unit

## 6.2 EAST NEWTON GATEWAY FEATURE

Guidelines for development design are incorporated in the Stage 1, Land Use Report. One aspect to be considered in the overall quality of the area, is the concept of a gateway feature to mark the entrance into the East Newton area. The Local Area Plan suggested that some form of gateway feature be considered for the corner of 72nd Avenue and 144th Street. This area (the southeast corner) is proposed as a multiple family area, featuring townhouse density residential development. Costs of developing this gateway feature are expected to be borne by townhouse developers in the immediate area.

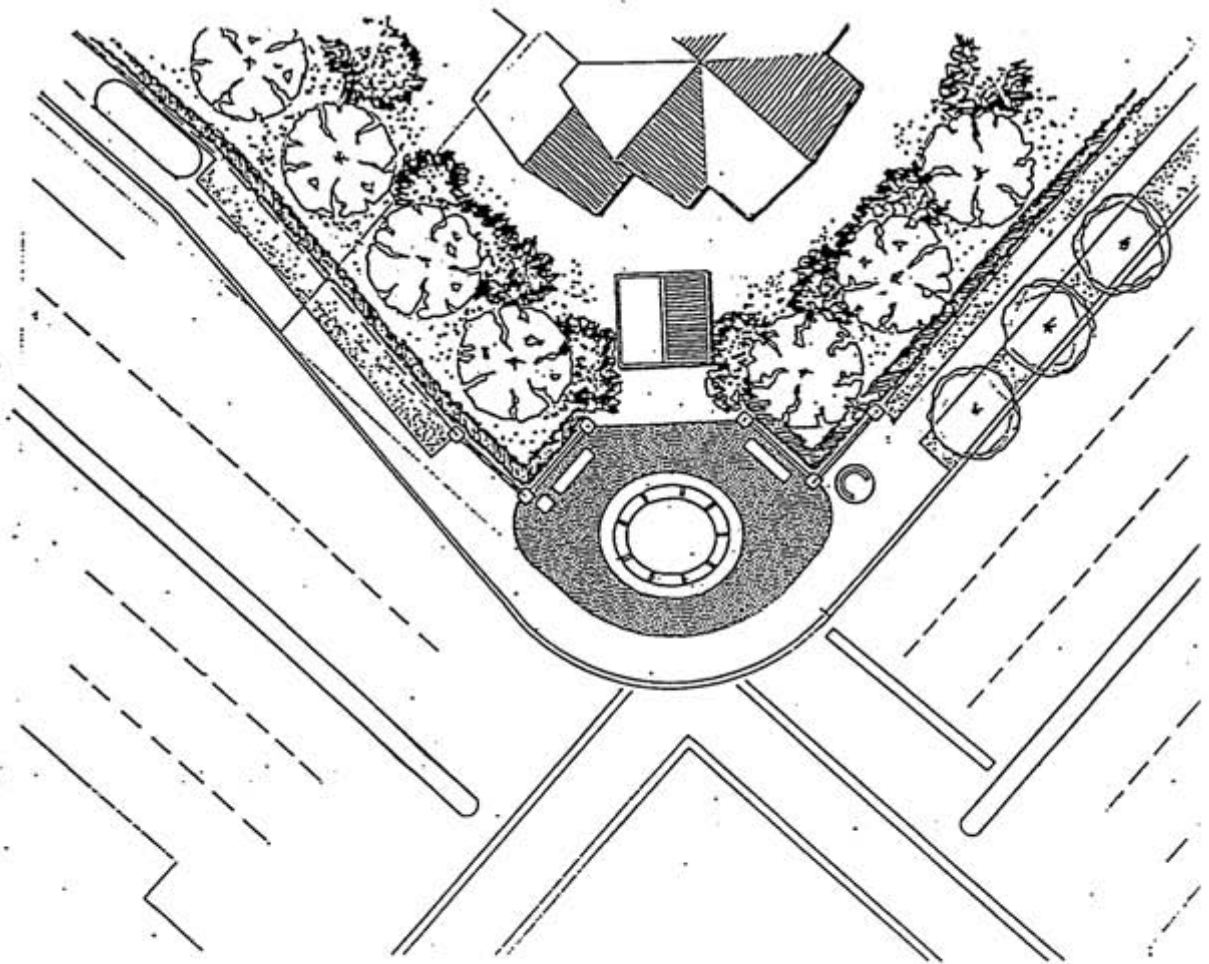
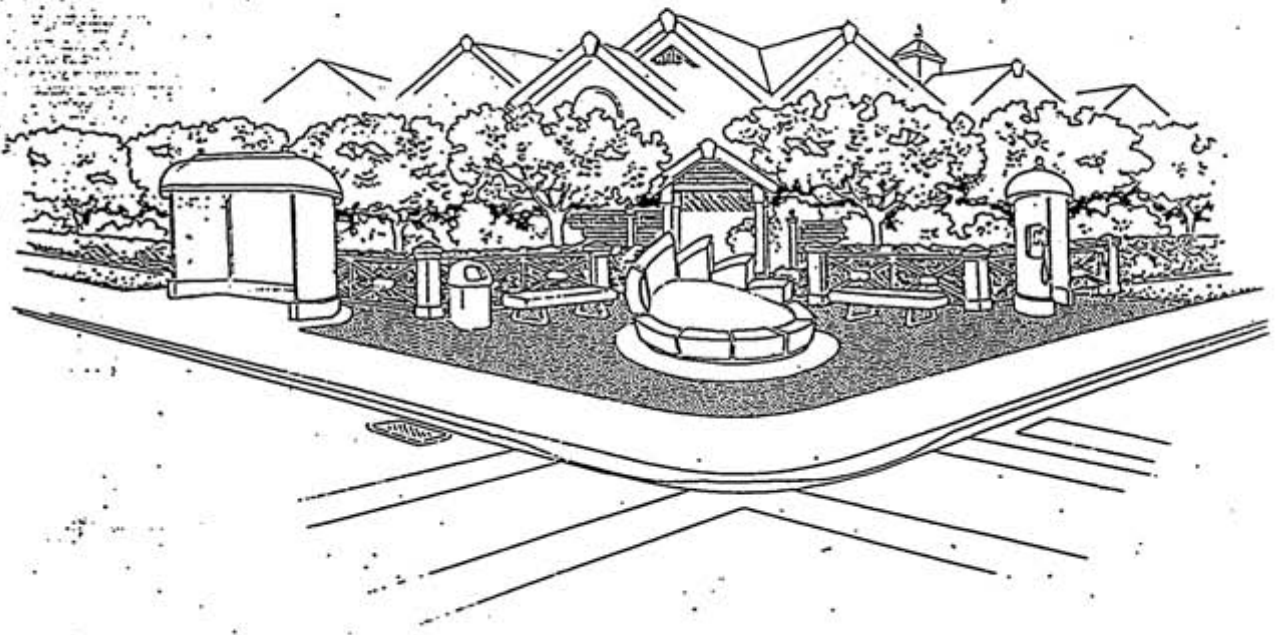
To provide some guidance to objectives for an entrance feature in this area, the following overall principles are proposed:

- Creation of an identifiable element through architectural/landscape features which provide an interesting streetscape element which can be carried through as part of the sidewalk treatment on 144th Street, as well as on 72nd Avenue.
- The amenity feature is intended to complement townhouses, which will be developed at the rear of the feature.

- Human scale elements are proposed to be introduced, through incorporation of a bus stop, a sign/poster kiosk, ornamental pavement, and a small seating area surrounding an architectural feature.
- If feasible, decorative tree species that can be replicated as boulevard trees along 72nd Avenue and along 144th Street.

A general concept which tries to reflect these conditions is illustrated on the page following. It is proposed that the East Newton entrance/gateway feature be incorporated as part of the townhouse site abutting 72nd and 144th Avenue, and that it comprise either a public space (part of the right of way), or alternatively the design feature could be retained as private property, but with provision for public access. The approximate area could be a triangular shaped wedge, extending about 10 metres back from the property intersection at 144th Street and 72nd Avenue. Private access to the townhouse project can be incorporated through a gated feature as illustrated on the top drawing in the sample illustration. Seating and kiosk areas, and the architectural feature would be common and publicly accessible space. The actual architectural feature can be designed as part of the townhouse complex, and could for example, include a tower structure (Clock tower), fountain, flagpoles, raised flower beds or similar features. It is important that any design be cognizant of maintenance requirements, and potential vandalism.

The illustration is intended purely as a guideline. More specific design should be carried out as part of the concept plan for the townhouse project, and should be reviewed by the City upon rezoning.

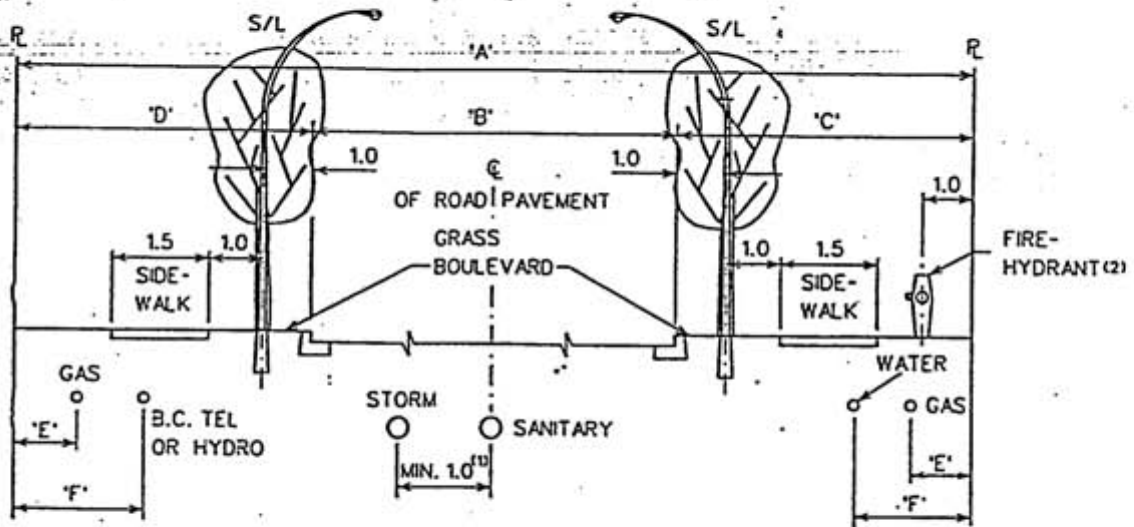


EAST NEWTON - GATEWAY FEATURE

## **Appendix A - Roads**

- Figure A-1 Typical Sections
- Figure A-2 Land Use Plan
- Figure A-3 Preferred Development Patterns and Access Points
- Figure A-4 School Access Point
- Figure A-5 Pedestrian Links

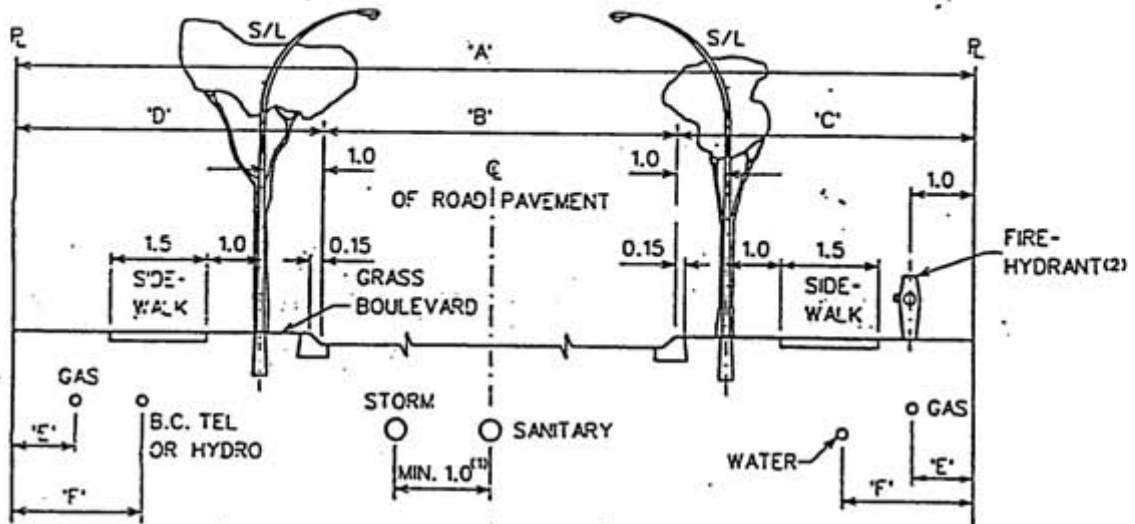
# TYPICAL SECTION - COLLECTOR ROAD



ROADS WITH BARRIER CURB

A	B	No. OF S/WALK	C	D	E	F
20	2.5	0	5.75	5.75	0.8	2
20	11*	0.12	4.5	4.5	0.6	2
20	11**	0.1	4.25	4.75	0.8	2
22	12.2	2.1	4.9	4.9	0.8	2
24	14	2.1	5	5	0.8	2

# TYPICAL SECTION - LOCAL ROAD



ROADS WITH ROLL-OVER CURB

A	B	No. OF S/WALK	C	D	E	F
16.5	8	0	4.25	4.25	0.8	2
20	8.5	1.2	5.75	5.75	0.8	2
20	11*	0.12	4.5	4.5	0.6	1.8
22	11**	0.1	5.5	5.5	0.8	2
22	12.2	2.1	4.9	4.9	0.8	2

NOTE : REFER TO MINIMUM SPACING BETWEEN SEWERS IN THE COMMON TRENCH DRAWING.



UMA Engineering Ltd.  
Engineers & Planners

8700a Okanada Alberta Saskatchewan  
Manitoba Ontario Yukon Territory  
Northwest Territories

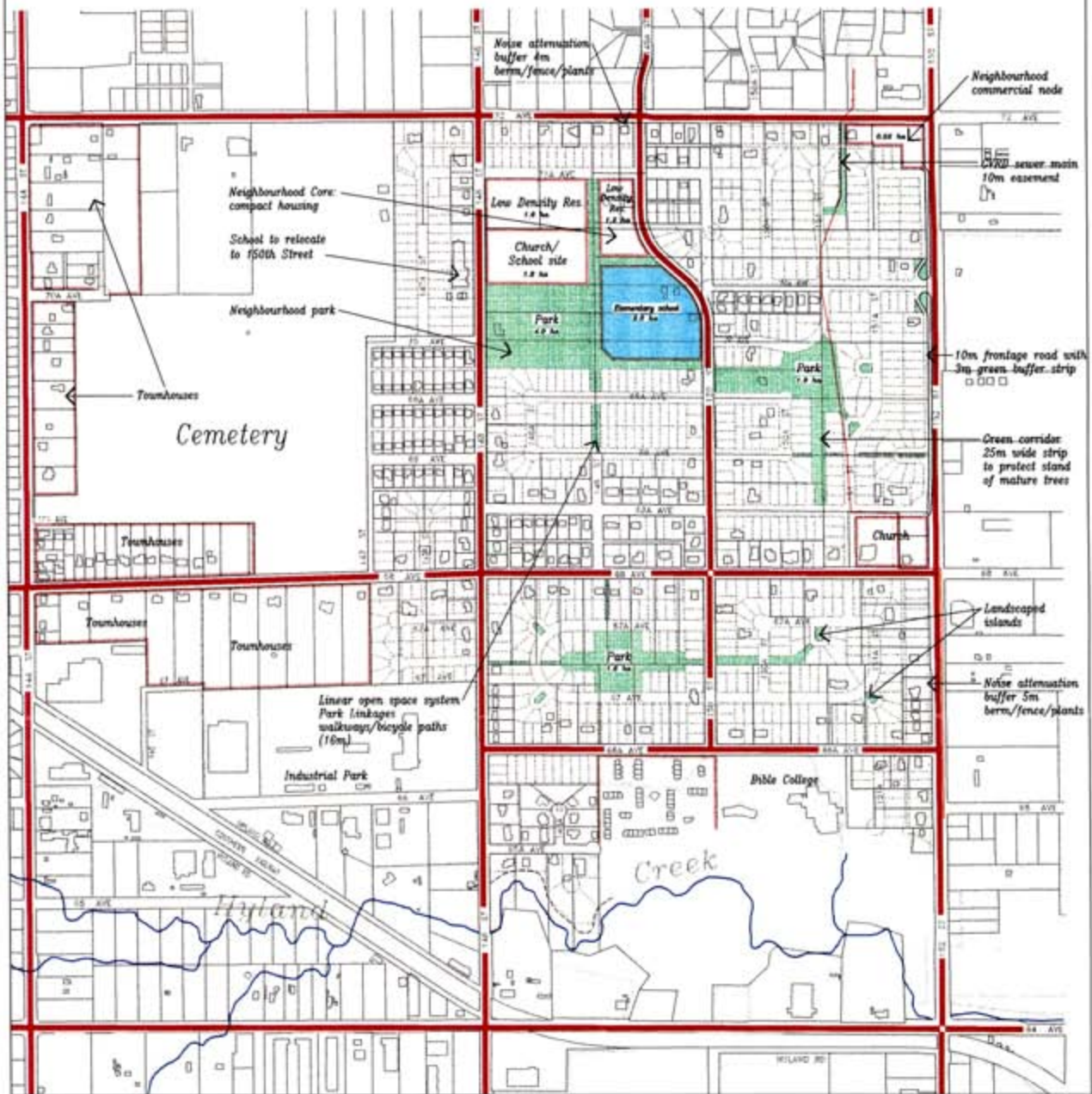
3030 Okanada Boulevard, Burnaby, B.C.  
V5G 2M4 Telephone: 426-1211

West Newton NCP  
CITY OF SURREY

8 MAY 1996

AMS

FIGURE A-1

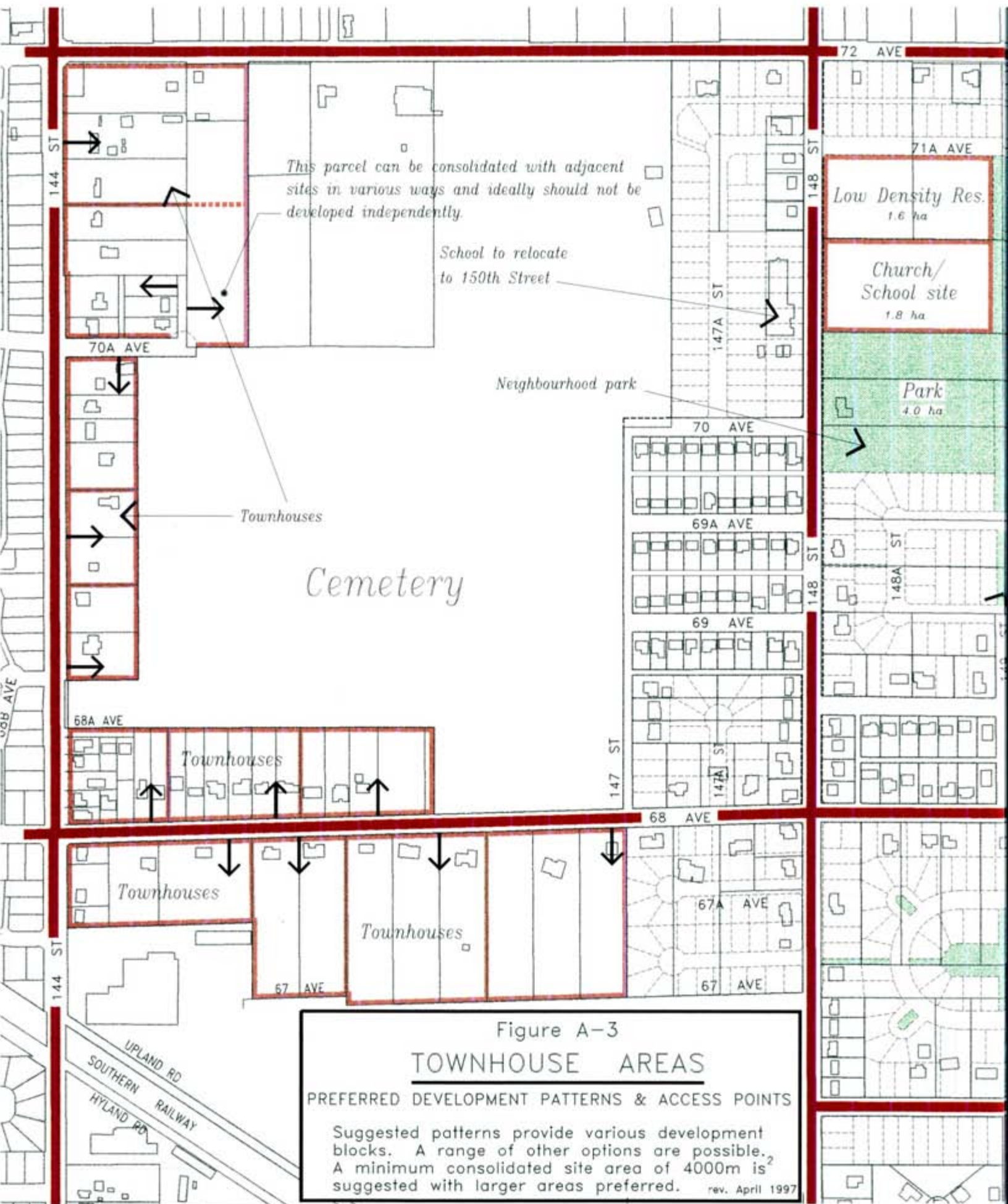


N.C.P. SUB-AREAS



FIGURE A-2

**NEIGHBOURHOOD CONCEPT PLAN**  
**East Newton, South Neighbourhood**  
 City of Surrey



This parcel can be consolidated with adjacent sites in various ways and ideally should not be developed independently.

School to relocate to 150th Street

Neighbourhood park

Townhouses

Cemetery

Townhouses

Townhouses

Townhouses

Low Density Res.  
1.6 ha

Church/  
School site  
1.8 ha

Park  
4.0 ha

### Figure A-3 TOWNHOUSE AREAS

#### PREFERRED DEVELOPMENT PATTERNS & ACCESS POINTS

Suggested patterns provide various development blocks. A range of other options are possible. A minimum consolidated site area of 4000m<sup>2</sup> is suggested with larger areas preferred. rev. April 1997

72 AVE

71A AVE

150A ST

ELEMENTARY SCHOOL

Park  
4.0 ha

70 AVE

150 ST

69A AVE

148A ST

69 AVE

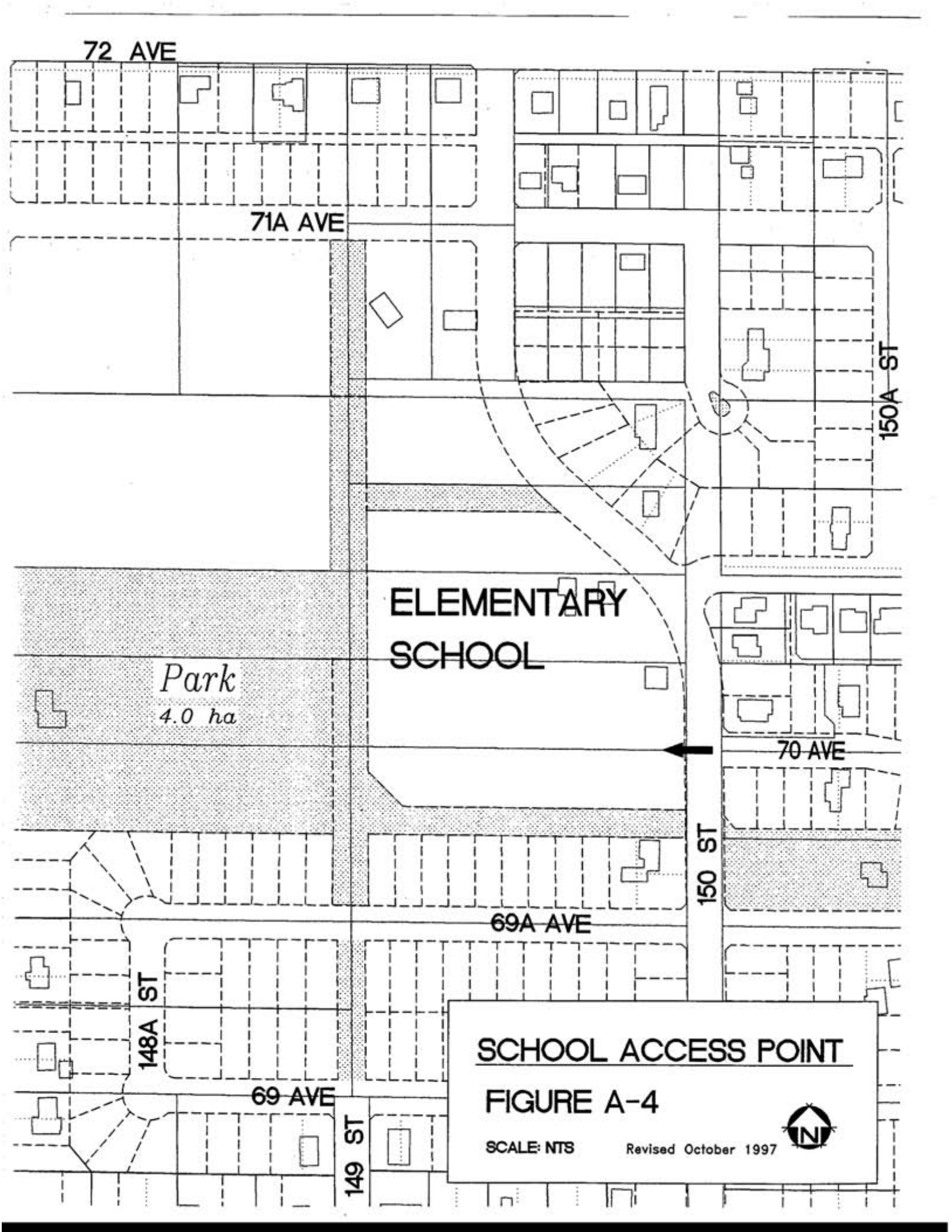
149 ST

SCHOOL ACCESS POINT

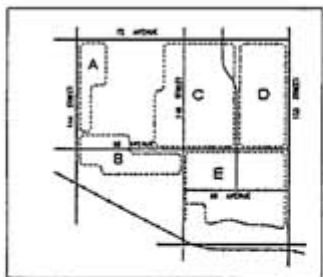
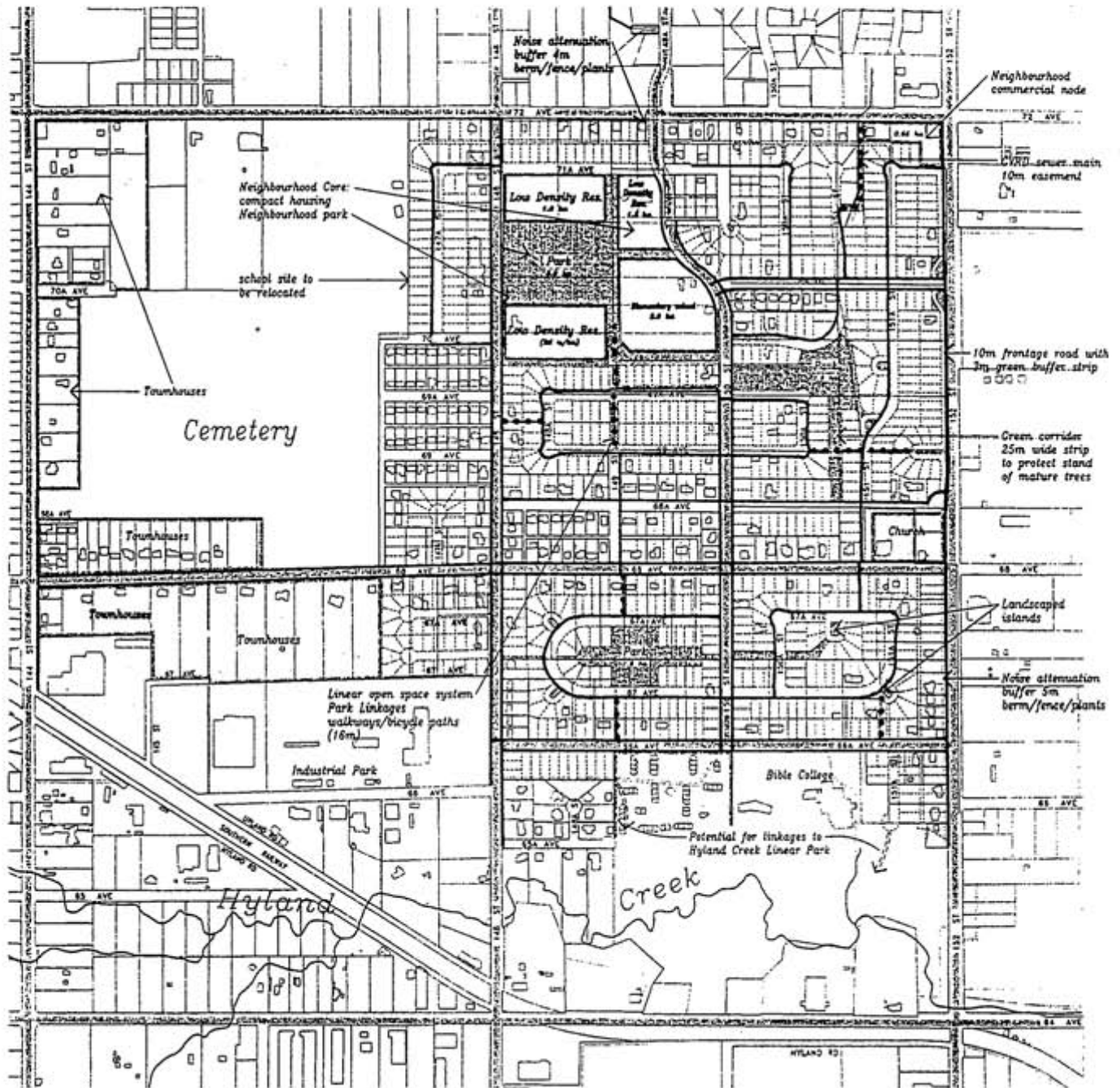
FIGURE A-4

SCALE: NTS

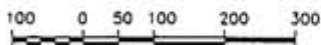
Revised October 1997







N.C.P. SUBAREAS



**PEDESTRIAN LINKS**

- Sidewalk location
- ..... Walkways

**NEIGHBOURHOOD CONCEPT PLAN**  
**East Newton, South Neighbourhood**  
 City of Surrey

**FIGURE A5**

February 1996



## **Appendix B - Sanitary Sewers**

- Cost Estimates
- Sanitary Servicing Concepts

1996 10 28

## EAST NEWTON NCP

### Sanitary Servicing Concepts for Area Between 152nd Street and GVS & DD Sewer

The sanitary catchment area for East Newton is shown in Figure 1 which is attached. As shown, the area west of the GVS&DD trunk sewer can be serviced by that trunk sewer. The remaining strip of area (between 152nd Street and the trunk sewer) will require a local community lift station and a forcemain that discharges to the GVS&DD trunk sewer. This strip is part of a larger sanitary catchment area which includes the East Newton Business Park. A preliminary review has been done to study different options to service that strip along 152nd. The concepts and associated costs are very preliminary and are for comparison purposes only.

#### 1.0 SANITARY FLOWS

##### 1.1 Strip along 152nd Street Contribution

Based on the NCP, there are 108 single family homes and a commercial area (0.7 ha) which are part of this sanitary catchment area requiring a pump station.

$$108 \text{ homes} \times 3.0 \text{ capita/home} = 324 \text{ capita}$$

$$0.7 \text{ ha} \times 50 \text{ capita/ha} = 35 \text{ capita}$$

$$359 \text{ capita} \times 350 \text{ L/capita/day} = 1.45 \text{ L/s}$$

$$\text{Peaking Factor} = 1 + \frac{14}{4 + \sqrt{0.359}} = 4.04$$

$$1.45 \text{ L/s} \times 4.04$$

$$5.86 \text{ L/s}$$

Say Q = 5.90 L/s (ground infiltrations, etc.)

##### 1.2 Business Park Contribution

Total Area: 36 ha

From Surrey Design Manual:

Industrial component: 30,000 L/ha/day

Population: 90 persons per hectare

Population: 36 ha x 90 c/ha = 3,240 capita

$$36 \text{ ha} \times 30,000 \text{ L/ha/day} = 1,080,000 \text{ L/day} = 1.25 \text{ L/s}$$

$$\text{Peaking Factor} = 1 + \frac{14}{4 \sqrt{3.240}} = 3.41$$

$$1.25 \text{ L/s} \times 3.41 = 42.62 \text{ L/s}$$

### Groundwater Infiltration

$$0.1 \text{ L/s/ha} \times 36 \text{ ha} + 3.6 \text{ L/s}$$

$$Q = 42.62 + 3.6 = \underline{46.22 \text{ L/s}}$$

Therefore the East Newton NCP contribution for the ultimate pump station is:

$$\frac{5.90}{(5.90 + 46.22)} * 100 = 11.32\%$$

## 2.0 ULTIMATE PUMP STATION CONCEPT

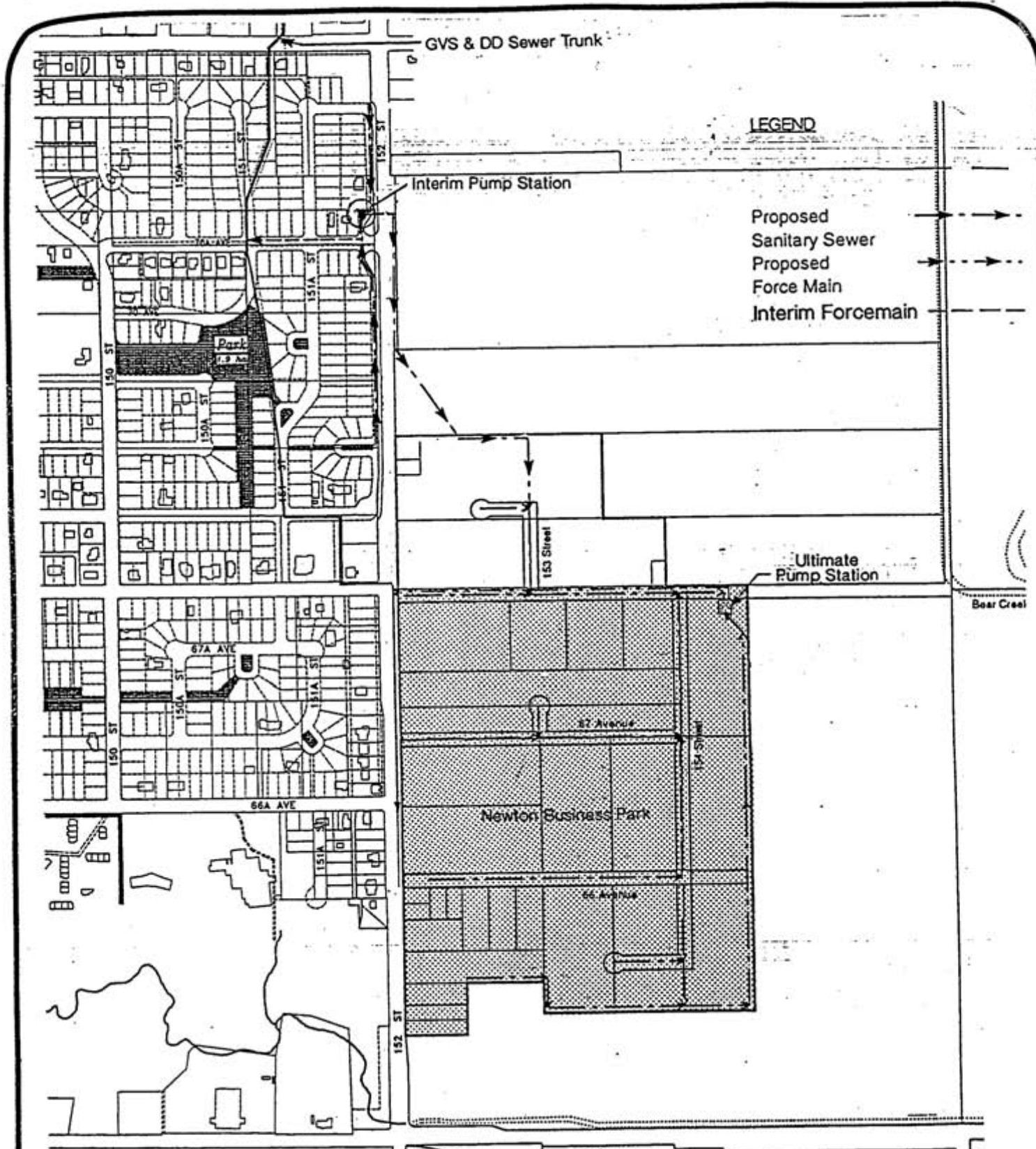
This concept has the strip along 152nd Street feeding into a gravity main that goes across the agricultural lands then through the Business Park to tie into the ultimate pump station at 68th Avenue and 155th Street. A forcemain would then tie into the GVS&DD trunk sewer. Estimated costs for this concept are as follows:

<u>Item</u>	<u>Estimated Cost</u>
1. Pump Station (Static Head 11m)	\$ 425,000
2. Flow Measurement Chamber	\$ 15,000
3. Land Industrial (0.1 ha)	\$ 250,000
4. Forcemain 200m dia. (500m at \$265/m)	\$ 132,500
5. Connection to GVS & DD Sewer	\$ 3,000
6. NCP allowance for contingency, engineering; Administration & GST (50%)	\$ 405,500
Total:	<hr/> \$ 1,216,000

The East Newton NCP contribution is approximately 11.32%. Therefore the costs attributed to the NCP are \$137,651.

## 3.0 INTERIM PUMP STATION CONCEPT

A number of options to service only the strip along 152nd Street have been studied. The present concept is considered the most practical and ties in easily to the ultimate pump station. It is understood that an ultimate pump station is still required to service the entire catchment area (strip and the Business Park) and that an interim pump station is not supported by the City of Surrey's future plans.



East Newton Neighbourhood Concept Plan  
 SOUTH NEIGHBOURHOOD  
 SANITARY SERVICING FOR AREA BETWEEN  
 152nd STREET AND GVS AND DD SEWER



## **Appendix C - Watermains**

- Listing of Existing Network
- Water Model Simulations

**City of Surrey - East Newton NCP  
Catalogue of Existing Water Mains**

<b>Location</b>	<b>Size</b>	<b>Material</b>
64 Ave: 148 St - 152 St	300	AC
69A Ave: 147 St - 148 St	150	AC
149 St: 68 Ave - #6892	150	AC
Surrey Municipal Works Yard	150	AC
68A Ave: 149 St - 150 St	150	AC
72 Ave: #14720 - 152 St	150	AC
150 St: 68 Ave - 71A Ave	100	AC
70A Ave: 144 St - 144A St	100	AC
71A Ave: #14955 - 150 St	100	AC
144A St: 70A Ave - #7085	100	AC
70A Ave: 150 St - #15092	100	AC
144 St: 68 Ave - 72 Ave	150	CI
66 Ave: Upland Rd - 148 St	150	CI
71A Ave: #14919 - #14955	150	CI
72 Ave: 144 St - #14720	300	DI
152 St: 64 Ave - #6959	300	DI
72 Ave: 148 St - 150A St	300	DI
148 St: 64 Ave - 72 Ave	300	DI
144 St: 67A Ave - 68 Ave	300	DI
Upland Rd: 144 St - 66 Ave	250	DI
66A Ave: 148 St - 150 St	250	DI
152 St: #6959 - 72 Ave	200	DI
68A Ave: 148 St - 149 St	150	DI
68A Ave: 144 St - #14438	150	DI
144 St: Hyland Rd - 67A Ave	300	PVC
68 Ave: 144 St - 152 St	300	PVC
147 St: 68 Ave - 70 Ave	200	PVC
66A Ave: 150 St - 152 St	200	PVC
150 St: 71A Ave - 72 Ave	200	PVC
148A Ave: 65A Ave - #6594	150	PVC
69 Ave: 147 St - 148 St	150	PVC
70 Ave: 147 St - 148 St	150	PVC
65A Ave: 148 St - #14882	150	PVC

## **Water Model Simulations**











As for Excel  
 1. Verify  
 2. Node 28 (120 In)  
 3. Rev: 28

PIPE TABLE

Pipe	UpNode	DownNode	Length m	Diameter mm	roughness	Flow l/s	Velocity m/s	HeadLoss m	Status	Description
1	1	2	300	150	100	0.10	0.01	0.00		
2	2	3	530	150	100	0.00	0.00	0.00	c	
3	3	4	180	300	125	-13.95	-0.20	0.03		
4	4	5	40	300	125	-23.68	-0.34	0.02		
5	5	6	510	300	125	40.74	0.88	0.68		
6	6	7	300	300	100	40.38	0.87	0.59		
7	7	8	420	300	125	4.20	0.00	0.00	c	
8	8	9	400	150	100	-3.71	-0.21	0.28		
9	9	10	100	300	125	40.17	0.87	0.13		
10	10	11	95	150	100	3.65	0.21	0.06		
11	11	12	100	300	125	36.63	0.50	0.10		
12	12	13	190	150	100	-3.13	-0.18	0.10		
13	13	14	110	300	125	35.34	0.54	4.34		PRV
14	14	15	180	150	100	-4.68	-0.27	0.30		
15	15	16	100	200	100	3.48	0.11	0.02		
16	16	17	150	200	100	0.00	0.00	0.00	c	
17	17	18	210	200	100	5.10	0.16	0.08		
18	18	19	200	300	125	-65.82	-0.80	0.52		
19	19	20	400	300	125	57.17	0.81	1.00		
20	20	21	190	300	125	51.51	0.73	0.09		
21	21	22	120	300	125	-6.84	-0.10	0.09		
22	22	23	80	300	125	42.65	0.60	0.12		
23	23	24	220	150	100	35.42	2.00	10.00		
24	24	25	200	150	100	-35.37	-2.00	9.06		
25	25	26	110	150	100	-49.65	-2.81	9.43		
26	26	27	220	300	125	62.68	0.89	0.65		
27	27	28	200	300	125	12.61	0.18	0.03		
28	28	29	310	300	125	-4.82	-0.07	0.01		
29	29	30	90	300	125	-13.75	-0.19	0.02		
30	30	31	480	150	100	9.19	0.52	1.83		
31	31	32	100	300	125	-4.76	-0.07	0.00		
32	32	33	300	300	125	-5.25	-0.07	0.01		
33	33	34	380	250	125	9.59	0.70	0.08		
34	34	35	430	250	125	8.41	0.17	0.07		
35	35	36	380	200	100	8.20	0.26	0.28		
36	36	37	420	300	125	18.18	0.28	0.13		
37	37	38	400	300	125	18.01	0.25	0.12		
38	38	39	480	300	125	-17.91	-0.25	0.14		
39	39	40	310	300	125	-25.58	-0.36	0.17		
40	40	41	390	300	125	-21.18	-0.30	0.15		
41	41	42	520	250	125	2.31	0.05	0.01		
42	42	43	410	300	125	4.09	0.08	0.01		
43	43	44	90	250	125	2.80	0.06	0.00		
44	44	45	200	200	100	3.36	0.11	0.12		
45	45	46	350	300	100	-3.99	-0.13	0.08		
46	46	47	110	280	125	-33.41	-0.68	0.34		
47	47	48	770	300	125	67.91	0.96	2.64		
48	48	49	400	300	125	43.98	0.62	0.61		
49	49	50	60	300	125	23.93	0.34	0.03		
50	50	51	440	250	125	23.93	0.49	0.53		
51	51	52	780	200	100	23.68	0.75	4.14		
52	52	53	200	300	125	23.68	0.33	0.08		
53	53	54	2010	300	125	40.85	0.58	2.69		
54	54	55	30	300	125	91.58	1.30	0.18		
55	55	56	300.00	300.00	125.00	91.58	1.30	4.17		
56	56	57	450.00	200.00	100.00	0.00	0.00	0.00	c	PRV Check Valve
57	57	58	400	300	125	32.34	0.46	0.35		
58	58	59	200	200	100	7.73	0.25	0.08		
59	59	60	300	200	100	7.63	0.24	0.20		
60	60	61	95	150	100	-3.88	-0.22	0.07		

NODE TABLE

Node	Elevation m	Demand l/s	Pressure psi	HGL m	XCoord	YCoord	Status	Description
1	70.00	0.00	30.97	91.81				72 Ave/144 St
2	66.00	0.10	36.65	91.81				144 St/70A Ave
3	40.00	0.77	66.81	86.90				144 St/68 Ave
4	24.00	0.14	89.38	86.93				Upland Rd/144 St
5	23.00	0.24	90.83	86.95				Hyland Rd/144 St
6	68.00	0.36	35.69	91.13				Cemetery - 144 St PRV
7	55.00	0.21	50.47	90.54				72 Ave/148 St
8	35.00	0.35	69.74	84.11				72 Ave/152 St
9	8.00	0.28	108.49	84.38				70 Ave/148 St
10	50.00	0.59	56.69	90.06				70 Ave/147 St
11	58.00	0.17	45.84	90.07				69A Ave/148 St
12	48.00	-0.42	59.59	89.96				69A Ave/147 St
13	55.00	0.35	49.78	90.05				69 Ave/148 St
14	45.00	0.38	55.42	85.02				69 Ave/147 St
15	61.00	0.42	48.74	85.32				69 Ave/148 St
16	44.00	0.38	58.09	84.91				68 Ave/147 St
17	37.00	0.21	68.72	85.38				68 Ave/148 St
18	36.00	0.35	70.87	85.90				#14583 - 68 Ave
19	37.00	0.59	68.16	84.99				68 Ave/145 St
20	20.00	0.62	92.32	85.00				68 Ave/148 St
21	18.00	0.21	95.18	85.02				66 Ave/148 St
22	14.00	0.49	100.87	85.02				65A Ave/148 St
23	14.00	0.24	100.88	85.03				64 Ave/148 St
24	35.00	0.56	69.57	83.98				71A Ave/150 St
25	37.00	0.49	66.73	83.98				70A Ave/150 St
26	40.00	120.45	49.58	74.91				68A Ave/149 St
27	35.00	0.31	70.08	84.34				68 Ave/149 St
28	32.00	0.35	73.82	83.97				68A Ave/150St
29	29.00	0.38	74.56	84.31				68 Ave/150 St
30	15.00	0.21	99.31	84.93				#14843 - 64 Ave
31	8.00	0.17	105.22	84.90				68 Ave/152 St
32	14.00	0.31	100.08	84.47				68A Ave/152 St
33	16.00	0.52	97.49	84.84				64 Ave/152 St
34	13.00	0.10	101.95	84.73				#6959 - 152 St
35	8.00	0.10	106.60	84.46				Upland Rd/66 Ave
36	18.00	0.40	97.78	86.85				68 Ave/138 St PRV
100	55.00	0.00	49.92	90.15				68 Ave/142 St
101	0.00	0.00	124.29	87.51				Hyland Rd/142 St
102	0.00	0.00	124.25	87.48				64 Ave/138 St
103	0.00	0.00	122.16	86.01				68 Ave/138 St 135m HGL S
104	0.00	0.00	134.22	94.50				68 Ave/138 St
105	55.00	0.00	55.84	94.32				71A Ave/148 St
106	53.00	0.10	53.13	90.41				71A Ave/147A Ave
107	56.00	0.10	48.75	90.33				70 Ave/147A Ave
108	55.00	0.10	49.69	90.13				

Waterworks for Excel  
City of Surrey  
Fire Flow @ Node 30 (1120 l/s)  
Fire-Header-30

PIPE TABLE

Pipe	UpNode	DNNode	Length m	Diameter mm	roughness	Flow l/s	Velocity m/s	HeadLoss m	Status	Description
1	1	2	300	150	100	0.10	0.01	0.00	C	
2	2	3	530	180	100	0.00	0.00	0.00	C	
3	3	4	180	300	125	-12.79	-0.18	0.03	C	
4	4	5	40	300	125	-24.24	-0.34	0.02	C	
5	5	6	510	300	125	-37.54	-0.63	0.58	C	
6	6	7	300	300	100	37.18	0.93	0.81	C	
7	7	8	420	300	125	0.00	0.00	0.00	C	
8	8	9	400	150	100	2.75	0.16	0.15	C	
9	9	10	100	300	125	36.97	0.52	0.11	C	
10	10	11	95	150	100	3.37	0.19	0.06	C	
11	11	12	100	300	125	37.71	0.46	0.09	C	
12	12	13	190	150	100	-2.85	-0.16	0.08	C	
13	13	14	110	300	125	35.14	0.50	5.57	C	PRV
14	14	15	190	160	100	-3.87	-0.22	0.21	C	
15	15	16	100	200	100	3.20	0.10	0.01	C	
16	16	17	15	200	100	0.00	0.00	0.00	C	
17	17	18	210	200	100	4.28	0.14	0.05	C	
18	18	19	270	300	125	-55.44	-0.80	0.61	C	
19	19	20	180	300	125	58.79	0.80	0.99	C	
20	20	21	190	300	125	51.95	0.73	0.40	C	
21	21	22	140	300	125	-33.37	-0.47	0.04	C	
22	22	23	80	300	125	38.63	0.55	0.10	C	
23	23	24	220	150	100	4.87	0.28	0.25	C	
24	24	25	200	150	100	3.73	0.21	0.14	C	
25	25	26	110	150	100	0.69	0.04	0.07	C	
26	26	27	230	300	125	28.08	0.40	0.15	C	
27	27	28	200	300	125	28.46	0.40	0.14	C	
28	28	29	310	300	125	56.65	0.80	0.76	C	
29	29	30	90	300	125	-25.33	-0.36	0.05	C	
30	30	31	480	150	100	10.92	0.62	2.52	C	
31	31	32	100	300	125	-14.62	-0.21	0.02	C	
32	32	33	300	300	125	-15.11	-0.21	0.06	C	
33	33	34	380	250	125	11.32	0.23	0.11	C	
34	34	35	430	300	125	81.46	1.66	5.02	C	
35	35	36	380	200	100	-38.76	-1.23	5.02	C	
36	36	37	420	300	125	10.18	0.14	0.04	C	
37	37	38	490	300	125	10.01	0.14	0.04	C	
38	38	39	490	300	125	-9.91	-0.14	0.05	C	
39	39	40	310	300	125	28.37	0.42	0.23	C	
40	40	41	390	300	125	27.31	0.39	0.25	C	
41	41	42	260	250	125	-4.15	-0.08	0.02	C	
42	42	43	410	300	125	-2.37	-0.03	0.00	C	
43	43	44	90	250	125	-3.68	-0.07	0.00	C	
44	44	45	200	200	100	-3.10	-0.10	0.05	C	
45	45	46	350	200	100	2.47	0.08	0.03	C	
46	46	47	110	250	125	-0.77	-0.02	0.07	C	
100	100	101	770	300	125	69.28	0.98	2.74	C	
101	101	102	300	300	125	44.77	0.63	0.63	C	
102	102	103	60	300	125	24.49	0.35	0.03	C	
103	103	104	440	250	125	24.49	0.50	0.55	C	
104	104	105	780	200	100	26.53	0.81	4.76	C	
105	105	106	2020	300	125	26.53	0.36	1.13	C	
106	106	107	1	2010	300	37.64	0.53	2.31	C	
107	107	108	30	300	125	94.78	1.34	0.19	C	
108	108	109	30,000	300,000	125,000	94.78	1.34	4.18	C	
109	24	106	450,000	200,000	100,000	0.00	0.00	0.00	C	PRV
110	105	10	400	300	125	29.75	0.42	0.30	C	Check Valve
111	106	107	120	200	100	7.12	0.23	0.07	C	
112	107	108	300	200	100	7.02	0.22	0.17	C	
113	10	108	85	150	100	-3.55	-0.20	0.08	C	

NODE TABLE

Node	Elevation m	Demand l/s	Pressure pal	HGL m	XCoord	YCoord	Status	Description
1	70.00	0.00	31.61	92.19				72 Ave/144 St
2	68.00	0.10	37.19	92.19				144 St/70A Ave
3	40.00	0.77	66.44	86.78				144 St/68 Ave
4	24.00	0.14	89.20	88.81				Upland Rd/144 St
5	23.00	0.24	90.65	86.83				Hyland Rd/144 St
6	68.00	0.36	36.36	91.66				Camemery - 144 St PRV
7	55.00	0.21	51.26	91.09				72 Ave/148 St
8	35.00	0.35	76.37	84.55				72 Ave/150 St
9	8.00	0.28	108.49	84.39				72 Ave/152 St
10	50.00	0.89	67.78	90.69				70 Ave/148 St
11	58.00	0.17	46.43	90.69				70 Ave/147 St
12	48.00	-0.42	60.50	90.60				69A Ave/148 St
13	65.00	0.35	50.67	90.68				69A Ave/147 St
14	48.00	0.38	55.42	85.02				69 Ave/149 St
15	51.00	0.42	48.62	85.24				69 Ave/147 St
16	44.00	0.38	56.13	84.93				68A Ave/148 St
17	37.00	0.21	68.67	85.28				68 Ave/147 St
18	36.00	0.35	70.72	85.80				#14593 - 68 Ave
19	37.00	0.89	68.01	84.89				68 Ave/148 St
20	20.00	0.52	81.08	84.13				66A Ave/148 St
21	18.00	0.21	93.99	84.18				68 Ave/148 St
22	14.00	0.49	99.70	84.20				68 Ave/148 St
23	14.00	0.24	99.79	84.26				84 Ave/148 St
24	35.00	0.85	70.31	84.50				71A Ave/150 St
25	37.00	0.49	67.47	84.51				70A Ave/150 St
26	40.00	0.45	63.45	84.67				68A Ave/149 St
27	36.00	0.31	70.64	84.74				68 Ave/149 St
28	32.00	0.35	74.61	84.63				68A Ave/150 St
29	29.00	0.38	78.97	84.60				68 Ave/150 St
30	15.00	120.21	91.05	79.11				66A Ave/150 St
31	8.00	0.17	108.25	84.22				#14943 - 64 Ave
32	14.00	0.31	99.92	84.36				66A Ave/152 St
33	16.00	0.52	98.76	84.13				64 Ave/152 St
34	13.00	0.10	101.09	84.18				#6959 - 152 St
35	8.00	0.10	108.45	84.36				Upland Rd/66 Ave
36	18.00	0.40	97.58	86.69				68 Ave/138 St PRV
100	55.00	0.00	49.92	90.15				68 Ave/142 St
101	0.00	0.00	124.15	87.41				Hyland Rd/142 St
102	0.00	0.00	124.11	87.38				64 Ave/138 St
103	0.00	0.00	121.28	85.39				68 Ave/138 St
104	0.00	0.00	134.22	94.50				68 Ave/138 St 135m HGL S
105	55.00	0.00	65.03	94.31				68 Ave/138 St
106	53.00	0.10	53.94	90.98				71A Ave/148 St
107	56.00	0.10	49.58	90.91				70 Ave/147A Ave
108	55.00	0.10	50.77	90.75				

Waterworks for Escal  
City of Surrey  
Fire Flow @ Node 34 (1120 l/s)  
File Name: 34

										PIPE TABLE					NODE TABLE									
Pipe	UpNode	DnNode	Length m	Diameter mm	roughness	INPUT		OUTPUT		HeadLoss m	Status	Description	INPUT			OUTPUT			HGL m	XCoord	YCoord	Status	Description	
						Flow l/s	Velocity m/s	Flow l/s	Velocity m/s				Nodes	Elevation m	Demand l/s	Pressure psi	Nodes	Elevation m						Demand l/s
1	1	2	300	150	100	0.01	0.10	0.01	0.00	0.00	c		1	70.00	0.00	31.58	92.24						72 Ave/144 St	
2	2	3	530	150	100	0.00	0.00	0.00	0.00	0.00			2	66.00	0.10	37.26	92.24						144 St/70A Ave	
3	3	4	180	300	125	-13.25	-0.19	0.03	0.03	0.03			3	40.00	0.77	66.45	86.79						144 St/58 Ave	
4	4	5	40	300	125	-24.19	-0.34	0.02	0.02	0.02			4	24.00	0.14	89.22	86.82							Upland Rd/144 St
5	5	6	510	300	125	37.10	0.52	0.57	0.57	0.57			5	23.00	0.24	90.68	86.84							Hyland Rd/144 St
6	6	7	300	300	100	36.74	0.82	0.50	0.50	0.50			6	66.00	0.36	36.45	91.67							Camelery - 144 St PRV
7	7	8	420	300	125	0.00	0.00	0.00	0.00	0.00	c		7	55.00	0.21	51.36	91.17							72 Ave/148 St
8	8	9	400	150	100	4.26	0.24	0.36	0.36	0.36			8	35.00	0.35	69.02	84.16							72 Ave/150 St
9	9	10	100	300	125	36.53	0.82	0.11	0.11	0.11			9	8.00	0.78	107.68	83.80							70 Ave/148 St
10	10	11	85	160	100	3.33	0.19	0.05	0.05	0.05			10	50.00	0.59	57.90	90.77							69A Ave/148 St
11	11	12	100	300	125	32.31	0.48	0.09	0.09	0.09			11	58.00	0.17	46.54	90.77							69A Ave/147 St
12	12	13	190	150	100	-2.81	-0.16	0.08	0.08	0.08		PRV	12	48.00	0.42	50.82	90.68							69A Ave/148 St
13	13	14	110	300	125	34.70	0.49	5.68	5.68	5.68			13	55.00	0.35	60.79	90.78							69A Ave/147 St
14	14	15	190	150	100	-4.04	-0.23	0.20	0.20	0.20			14	46.00	0.38	55.42	85.02							69A Ave/148 St
15	15	16	100	200	100	3.18	0.10	0.01	0.01	0.01			15	51.00	0.42	48.60	85.22							69 Ave/147 St
16	16	17	100	200	100	0.00	0.00	0.00	0.00	0.00	c		16	44.00	0.38	58.12	84.82							69A Ave/148 St
17	17	18	210	200	100	4.48	0.14	0.06	0.06	0.06			17	37.00	0.21	80.05	86.27							69 Ave/147 St
18	18	19	270	300	125	-53.88	-0.80	0.52	0.52	0.52			18	36.00	0.35	70.71	85.79							69 Ave/147 St
19	19	20	400	300	125	57.22	0.81	1.00	1.00	1.00			19	37.00	0.59	67.98	84.87							69 Ave/147 St
20	20	21	190	300	125	52.21	0.74	0.40	0.40	0.40			20	20.00	0.52	91.54	84.46							69 Ave/148 St
21	21	22	160	120	300	-31.82	-0.45	0.06	0.06	0.06			21	18.00	0.21	94.32	84.41							69 Ave/148 St
22	22	23	80	300	125	36.36	0.64	0.10	0.10	0.10			22	14.00	0.49	99.07	84.32							69 Ave/148 St
23	23	24	220	150	100	6.36	0.36	0.42	0.42	0.42			23	14.00	0.24	90.47	84.04							69 Ave/148 St
24	24	25	200	150	100	5.92	0.31	0.29	0.29	0.29			24	35.00	0.66	69.83	84.17							71A Ave/150 St
25	25	26	110	150	100	0.00	0.00	0.02	0.02	0.02			25	37.00	0.49	67.00	84.17							70A Ave/150 St
26	26	27	220	300	125	42.82	0.60	0.32	0.32	0.32			26	40.00	0.45	63.21	84.51							80A Ave/149 St
27	27	28	200	300	125	42.60	0.60	0.29	0.29	0.29			27	35.00	0.31	70.37	84.55							69 Ave/149 St
28	28	29	310	300	125	40.72	0.69	0.41	0.41	0.41			28	32.00	0.35	74.16	84.22							69 Ave/149 St
29	29	30	90	300	125	23.91	0.34	0.04	0.04	0.04			29	29.00	0.38	78.49	84.26							69 Ave/150 St
30	30	31	490	150	100	10.40	0.59	2.30	2.30	2.30			30	15.00	0.21	88.28	84.20							69 Ave/150 St
31	31	32	100	300	125	34.10	0.48	0.10	0.10	0.10			31	8.00	0.17	106.39	82.91							714943 - 64 Ave
32	32	33	300	300	125	33.62	0.48	0.28	0.28	0.28			32	14.00	0.31	99.02	83.22							69 Ave/152 St
33	33	34	380	250	125	10.80	0.22	0.11	0.11	0.11			33	16.00	0.62	96.47	83.22							69 Ave/152 St
34	34	35	430	250	125	16.28	0.33	0.25	0.25	0.25			34	13.00	0.10	120.10	97.78							64 Ave/152 St
35	35	36	300	300	100	16.07	0.51	0.96	0.96	0.96			35	8.00	0.10	107.55	83.71							69 Ave/152 St
36	36	37	420	300	125	59.42	0.64	1.13	1.13	1.13			36	18.00	0.40	97.59	86.71							Upland Rd/66 Ave
37	37	38	400	300	125	69.25	0.84	1.07	1.07	1.07			37	55.00	0.00	49.92	90.15							69 Ave/139 St PRV
38	38	39	490	300	125	66.85	0.86	1.37	1.37	1.37			38	8.00	0.00	124.16	87.42							69 Ave/142 St
39	39	40	310	300	125	45.30	0.64	0.80	0.80	0.80			39	0.00	0.00	124.12	87.39							Hyland Rd/142 St
40	40	41	390	300	125	41.74	0.68	0.54	0.54	0.54			40	0.00	0.00	121.02	85.21							64 Ave/138 St
41	41	42	250	250	125	-5.65	-0.12	0.04	0.04	0.04			41	0.00	0.00	134.22	94.50							69 Ave/139 St
42	42	43	410	300	125	-3.88	-0.05	0.01	0.01	0.01			42	85.00	0.00	55.82	94.31							71A Ave/148 St
43	43	44	80	250	125	-5.16	-0.11	0.01	0.01	0.01			43	86.00	0.10	64.05	91.06							71A Ave/147A St
44	44	45	260	200	100	-4.60	-0.16	0.01	0.01	0.01			44	86.00	0.10	49.69	90.99							70 Ave/147A Ave
45	45	46	390	200	100	3.98	0.13	0.08	0.08	0.08			45	86.00	0.10	50.88	90.83							
46	46	47	280	250	125	-0.48	-0.01	0.04	0.04	0.04			46	86.00	0.10	50.88	90.83							
100	100	101	770	300	125	69.17	0.98	2.73	2.73	2.73			100	55.00	0.00	49.92	90.15							
101	101	102	400	300	125	44.74	0.63	0.63	0.63	0.63			101	0.00	0.00	124.16	87.42							
102	102	103	60	300	125	24.43	0.35	0.03	0.03	0.03			102	0.00	0.00	124.12	87.39							
103	103	104	440	250	125	24.43	0.50	0.85	0.85	0.85			103	0.00	0.00	121.02	85.21							
104	104	105	780	200	100	26.05	0.83	4.94	4.94	4.94			104	0.00	0.00	134.22	94.50							
105	105	106	2020	300	125	26.05	0.37	1.18	1.18	1.18			105	85.00	0.00	55.82	94.31							
106	106	107	2010	300	125	37.21	0.63	2.26	2.26	2.26			106	55.00	0.00	55.82	94.31							
107	107	108	30	300	125	95.22	1.35	0.19	0.19	0.19			107	86.00	0.10	49.69	90.99							
108	108	109	3000	300	125	95.22	1.35	4.15	4.15	4.15			108	86.00	0.10	49.69	90.99							
109	109	110	4500	300	100	0.00	0.00	0.00	0.00	0.00	c		109	86.00	0.10	49.69	90.99							
110	110	111	460	300	125	28.39	0.42	0.29	0.29	0.29			110	86.00	0.10	50.88	90.83							
111	111	112	120	200	100	7.04	0.22	0.07	0.07	0.07			111	86.00	0.10	50.88	90.83							
112	112	113	108	300	125	6.94	0.22	0.16	0.16	0.16			112	86.00	0.10	50.88	90.83							
113	113	114	95	150	100	-3.51	-0.20	0.06	0.06	0.06			113	86.00	0.10	50.88	90.83							

PIPE TABLE										NODE TABLE									
Pipe	UpNode	DNNode	Length m	Diameter mm	cuploss	Flow l/s	Velocity m/s	Headloss m	Status	Description	Node	Elevation m	Demand l/s	Pressure pa	HGL m	XCoord	YCoord	Status	Description
1	1	2	300	150	100	0.10	0.01	0.00	c		1	70.00	0.00	23.68	85.90				72 Ave/144 St
2	2	3	630	150	100	0.00	0.00	0.00	c		2	66.00	0.10	26.26	85.90				144 St/70A Ave
3	3	4	180	300	125	139.62	1.98	2.35	c		3	40.00	0.77	62.31	76.83				144 St/68 Ave
4	4	5	40	300	125	-69.61	-0.98	0.14	c		4	24.00	0.14	71.70	74.49				Upland Rd/144 St
5	5	6	510	300	125	76.42	1.08	2.18	c		5	23.00	0.24	73.33	74.63				Hyland Rd/144 St
6	6	7	300	300	100	76.05	1.08	1.92	c		6	66.00	0.36	25.17	83.72				Cemetery - 144 St PRV
7	7	8	420	300	125	0.00	0.00	0.00	c		7	85.00	0.21	38.07	81.81				72 Ave/148 St
8	8	9	400	150	100	-0.44	-0.03	0.01	c		8	35.00	0.35	62.37	78.91				72 Ave/160 St
9	9	10	100	300	125	76.84	1.07	0.42	c		9	8.00	0.28	100.73	78.92				70 Ave/162 St
10	10	11	85	150	100	6.73	0.38	0.20	c		10	60.00	0.59	42.96	80.25				70 Ave/148 St
11	11	12	100	300	125	66.22	0.97	0.35	c		11	58.00	0.17	31.68	80.30				70 Ave/147 St
12	12	13	190	150	100	-6.21	-0.35	0.34	c		12	48.00	0.42	45.31	79.90				69A Ave/148 St
13	13	14	110	300	125	74.02	1.05	0.44	c	PRV	13	55.00	0.35	35.86	80.25				69A Ave/147 St
14	14	15	190	150	100	5.55	0.84	0.76	c		14	46.00	0.38	47.62	79.46				69 Ave/148 St
15	15	16	100	200	100	6.56	0.21	0.09	c		15	51.00	0.42	39.34	78.70				69 Ave/147 St
16	16	17	100	200	100	0.00	0.00	0.00	c		16	44.00	0.38	50.01	79.22				68 Ave/148 St
17	17	18	210	200	100	-9.13	-0.29	0.19	c		17	37.00	0.21	88.95	78.61				68 Ave/147 St
18	18	19	270	300	225	60.51	0.86	0.88	c		18	36.00	0.35	85.55	77.93				#14583 - 68 Ave
19	19	20	400	300	125	-60.16	-0.85	1.10	c		19	37.00	0.89	59.51	78.90				68 Ave/148 St
20	20	21	180	300	125	-91.59	-0.73	0.39	c		20	20.00	0.52	83.58	78.85				66A Ave/148 St
21	21	22	120	300	125	-98.74	-0.83	0.31	c		21	18.00	0.21	86.39	78.93				66 Ave/148 St
22	22	23	90	300	125	64.09	0.91	0.26	c		22	14.00	0.49	92.16	78.88				65A Ave/148 St
23	23	24	26	200	100	4.98	0.28	0.26	c		23	14.00	0.24	92.40	79.06				64 Ave/148 St
24	24	25	200	150	100	1.83	0.10	0.04	c		24	35.00	0.68	62.37	78.91				71A Ave/150 St
25	25	26	110	150	100	2.88	0.15	0.04	c		25	37.00	0.49	59.53	78.91				70A Ave/150 St
26	26	27	220	300	125	-6.66	-0.09	0.01	c		26	40.00	0.45	55.33	78.95				68A Ave/149 St
27	27	28	200	300	125	-4.30	-0.06	0.00	c		27	35.00	0.31	62.36	78.91				68 Ave/149 St
28	28	29	310	300	125	13.23	0.19	0.05	c		28	32.00	0.35	66.63	78.92				68A Ave/150 St
29	29	30	90	300	125	16.28	0.23	0.02	c		29	29.00	0.38	70.89	78.92				68 Ave/150 St
30	30	31	490	150	100	-41.41	-2.34	29.74	c		30	18.00	0.21	80.71	78.87				66A Ave/150 St
31	31	32	100	300	125	-25.34	-0.36	0.06	c		31	8.00	0.17	100.86	79.01				#14943 - 64 Ave
32	32	33	300	300	125	-25.83	-0.37	0.17	c		32	14.00	0.31	92.21	78.92				66 Ave/152 St
33	33	34	380	250	125	208.99	4.26	25.39	c		33	16.00	0.52	89.38	78.93				66 Ave/152 St
34	34	35	430	250	125	-3.57	-0.07	0.02	c		34	13.00	0.10	93.71	78.98				#6959 - 152 St
35	35	36	380	200	100	-3.78	-0.12	0.07	c		35	8.00	0.10	100.73	78.92				Upland Rd/68 Ave
36	36	37	420	300	125	9.86	0.14	0.04	c		36	18.00	0.40	44.16	49.09				68 Ave/138 St PRV
37	37	38	400	300	125	-9.59	-0.14	0.04	c		37	8.00	0.00	111.78	78.70				Hyland Rd/142 St
38	38	39	490	300	125	-9.59	-0.14	0.04	c		38	8.00	0.00	111.47	78.48				64 Ave/138 St
39	39	40	310	300	125	-5.28	-0.07	0.01	c		39	16.00	0.31	92.21	78.92				68 Ave/138 St
40	40	41	390	300	125	-4.15	-0.06	0.01	c		40	0.00	0.00	115.31	81.19				68 Ave/138 St
41	41	42	620	250	125	-0.95	-0.02	0.00	c		41	0.00	0.00	134.22	94.50				68 Ave/138 St
42	42	43	410	300	125	0.82	0.01	0.00	c		42	56.00	0.00	56.15	93.84				68 Ave/138 St
43	43	44	90	250	125	-0.46	-0.01	0.00	c		43	53.00	0.10	40.31	81.38				71A Ave/147A St
44	44	45	200	200	100	-0.09	0.00	0.00	c		44	56.00	0.10	36.69	81.13				70 Ave/147A Ave
45	45	46	390	200	100	-0.72	-0.02	0.00	c		45	56.00	0.10	36.69	81.13				
46	46	47	110	250	125	0.53	0.01	0.00	c		46	56.00	0.10	36.69	81.13				
47	47	48	770	300	125	149.97	2.12	11.45	c		47	56.00	0.10	36.69	81.13				
101	101	102	400	300	125	80.22	1.14	1.87	c		101	0.00	0.00	49.92	90.16				68 Ave/142 St
102	102	103	60	300	125	69.75	0.99	0.22	c		102	0.00	0.00	111.47	78.48				Hyland Rd/142 St
103	103	104	440	250	125	69.75	0.99	0.22	c		103	0.00	0.00	115.31	81.19				64 Ave/138 St
104	104	105	780	200	100	35.94	1.14	8.97	c		104	0.00	0.00	134.22	94.50				68 Ave/138 St
105	105	106	2020	300	125	35.94	0.51	2.13	c		105	56.00	0.00	56.15	93.84				68 Ave/138 St
106	106	107	2010	300	125	35.94	0.51	2.13	c		106	53.00	0.10	40.31	81.38				71A Ave/147A St
107	107	108	30	300	125	185.91	2.63	3.68	c		107	56.00	0.10	36.69	81.13				70 Ave/147A Ave
108	108	109	3000	3000	125000	185.91	2.63	3.68	c		108	56.00	0.10	36.69	81.13				
109	109	110	450000	20000	100000	0.00	0.00	0.00	c		109	56.00	0.10	36.69	81.13				
110	110	111	400	300	125	61.27	0.87	1.13	c		110	56.00	0.10	36.69	81.13				
111	111	112	120	200	100	14.37	0.46	0.26	c		111	56.00	0.10	36.69	81.13				
112	112	113	300	200	100	14.37	0.46	0.26	c		112	56.00	0.10	36.69	81.13				
113	113	114	85	150	100	-7.64	-0.43	0.25	c		113	56.00	0.10	36.69	81.13				



## **Appendix D - Storm Sewers**

- Modeling Data
- Peak Flows for Various Storm Durations
- Cost Estimates
- Figure D-1 - 71 Avenue and 68 Avenue Watershed
- Figure D-2 - Detention Facility #1
- Figure D-3 - Required Easement for 71 Avenue Dyke
- Figure D-4 - Detention Facility #2

## STORM COST ESTIMATES

Location	Description	Quantity	Unit Price	Cost
<b>1.0 Catchment Area 1</b>				
1.1 144 St./68 Ave.	Diversion structure	1	L.S.	\$15,000
1.2 68 Ave.:144-146A St.	600mm dia. sewer	400m	\$570/m*	\$228,000
1.3 146A St.:68-67 Ave.	750mm dia. sewer	190m	\$765/m*	\$145,350
1.4 67 Ave.:146 A St.	Detention Facility #1 Land Acquisition	11,300m <sup>3</sup>	\$60/m <sup>3</sup>	\$678,000
		0.4ha (works yard)	\$500,000/ha	\$200,000
		0.6ha (townhouse)	\$990,000/ha	<u>\$594,000</u>
				\$1,472,000
1.5 146A St.:67-66 Ave.	Ditch Improvements Land Acquisition		L.S.	\$50,000
		0.1ha	\$800,000/ha	<u>\$80,000</u>
				\$130,000
1.6 66 Ave.:146A-147 St.	Ditch maintenance		L.S.	\$20,000
1.7 147 St.:66A - Hyland Creek	1050mm sewer	90m	\$1080/m*	\$97,200
1.8 148 St./67 Ave.	Diversion structure	1	L.S.	\$15,000
1.9 67 Ave.:147 St.-148 St.	600mm dia. sewer	250m	\$570/m*	\$142,500
<b>2.0 Catchment Area 2</b>				
2.1 68A Ave.:150-152 St.	600mm sewer	390m	\$570/m*	\$222,300
2.2 71 Ave. Ditch/Dyke	Import Clay Strip existing organics Place clay and compact Land acquisition Hydroseed Ditch maintenance Floodboxes Contingency*	14,000m <sup>3</sup>	\$5/m <sup>3</sup>	\$70,000
			L.S.	\$6,000
		14,000m <sup>3</sup>	\$2/m <sup>3</sup>	\$28,000
		1.2ha	\$50,000/ha	\$60,000
		2.1ha (21,000m <sup>2</sup> )	\$0.75/m <sup>2</sup>	\$15,750
			L.S.	\$20,000
			L.S.	\$40,000
			<u>\$119,875</u>	
			\$359,625	
2.3 152A:68A Ave.-71 Ave. Ditch	600mm dia. sewer	450m	\$570/m*	\$256,500
<b>3.0 Catchment Area 3</b>				
3.1 151A St.:65 Ave.	Detention Facility #2 Land acquisition	1,700m <sup>3</sup>	\$60/m <sup>3</sup>	\$102,000
		0.25ha	\$800,000/ha	<u>\$200,000</u>
				\$302,000
3.2 151 St.:66A Ave. - Detention Facility #2	600mm dia. sewer Land Acquisition	300m	\$570/m*	\$171,000
		0.09ha	\$500,000/ha	<u>\$ 45,000</u>
				\$216,000
3.3 151 St./65A Ave.	Diversion structure	1	L.S.	\$10,000

\*A 50% factor is applied to cover all other costs including GST, design and administration, contingency, etc.

NOTE: All costs are subject to soil investigation.

## Rainfall Data

Rainfall data from the Surrey Municipal Hall rain gauge was used in the analysis of the East Newton Area. Twenty-seven years of rain gauge data were collected from 1963 to 1990. The rainfall for the 2, 5, and 100 year storm events of various durations are summarized in the following table:

Surrey Municipal Hall Rainfall

Return Period (Years)	AES 1 Hr (mm)	AES 2 Hr (mm)	AES 6 Hr (mm)	SCS Type 1A 12 Hr (mm)	SCS Type 1A 24 Hr (mm)
2	10.3	14.9	27.4	39.7	55.8
5	13.4	18.1	33.0	47.9	67.3
100	21.9	26.9	48.1	70.3	98.9

For short duration storms, AES distribution for the B.C. Coast was assumed. The Soil Conservation Services (SCS) Type 1A distribution was used for the 12 and 24 hour duration storms, based on the SCS synthetic rainfall distribution typical of the northern portion of the Pacific coastal region.

## Hydrologic Modelling

The runoff response of the watershed was determined using the INTERHYMO/OTTHYMO.89 computer program. OTTHYMO is a single event based hydrologic model which can simulate hydrographs from rural and urban watersheds. The program is capable of generating a hydrograph for a catchment and routing it through a channel, pipe or reservoir. The model is therefore ideally suited for partially urbanized watersheds.

To use the OTTHYMO model, the physiographic characteristics of each sub-catchment must be identified. The land use, area, slope and soil type are important characteristics that influence input parameters such as time to peak and SCS Curve Numbers (CN).

As no streamflow or runoff data exists for this area, calibration of the model was not possible, parameters were therefore determined based on published values and previous drainage modelling experience in Surrey.

The Nashyd subroutine was used to model the existing conditions, as the catchment area is largely undeveloped and the Urbhyd subroutine was used to model the post development conditions.

### Time to Peak

The runoff response time of the watershed is described by the time to peak ( $T_p$ ). This parameter defines the length of time between the start of the rainfall and the unit hydrograph peak. The Soil Conservation Services (SCS) method was applied to calculate the time to peak;

$$T_p = 0.67 \cdot T_c$$

The time of concentration ( $T_c$ ) was developed for each catchment area and was based on City of Surrey Design Standards (1995) where;

$$T_c = \frac{C_t L^n}{12 s^{0.5}}$$

$T_c$  = Time of Concentration (hr)

$C_t$  = Concentration Co-efficient

$L$  = Flow path length (m)

$n$  = Channel friction factor

$s$  = Basin Slope (m/m)

The flow path length was divided between overland flow, channel flow, and pipe flow depending on the drainage characteristics of the individual catchments. The subcatchment areas were less than 20 ha, and the maximum overland flow path was 250 m.

### Curve Number (CN)

The Curve Number is used to describe the soil and land use characteristics for each catchment area. For the hydrologic computer model, the CN parameter is used to compute the rainfall excess.

The soil types within the study area were classified using the SCS hydrologic soil group (HSG) method. The soil characteristics from the Surficial Geological map indicate poorly drained silty till. Based on these soil descriptions, the predominant hydrologic soil group for the basin is classification C. Impervious surfaces are defined in the CN value by percent impervious surface within the catchment area. A weighted CN value was determined for each catchment area based on land use. CN values of 70, 74 and 98 were

used for wooded , open space and impervious areas respectively. These values were used as the basis for determining the weighted CN value for each sub catchment area.

The percent of impervious area was used as an input variable to the Standhyd subroutine, the ranges of impervious values for various land used are as follows;

low density residential	30% - 40%
high density residential	45% - 50%
commercial / industrial	55% - 70%

Computer modelling was conducted to assess the overall hydrologic response of the watershed. A summary of existing and post development peak flows for the various return periods and storm durations are presented in the following tables.

**Summary of Post-Development Peak Flows in Catchment Area 1**

Duration (hr)	2 Year (m <sup>3</sup> /s)	5 Year (m <sup>3</sup> /s)	100 Year (m <sup>3</sup> /s)
1	1.44	1.97	4.78
2	1.19	1.51	3.66
6	0.97	1.55	2.94
12	1.03	1.61	3.22
24	0.85	1.16	2.46

**Summary of Post-Development Peak Flows in Catchment Area 2**

Duration (hr)	2 Year (m <sup>3</sup> /s)	5 Year (m <sup>3</sup> /s)	100 Year (m <sup>3</sup> /s)
1	0.89	1.25	3.62
2	0.74	0.92	2.74
6	0.55	0.93	2.10
12	0.60	0.99	2.37
24	0.45	0.59	1.63

### Summary of Post-Development Peak Flows in Catchment Area 3

Duration (hr)	2 Year (m <sup>3</sup> /s)	5 Year (m <sup>3</sup> /s)	100 Year (m <sup>3</sup> /s)
1	0.26	0.38	1.03
2	0.21	0.26	0.78
6	0.14	0.28	0.59
12	0.15	0.28	0.64
24	0.11	0.15	0.45

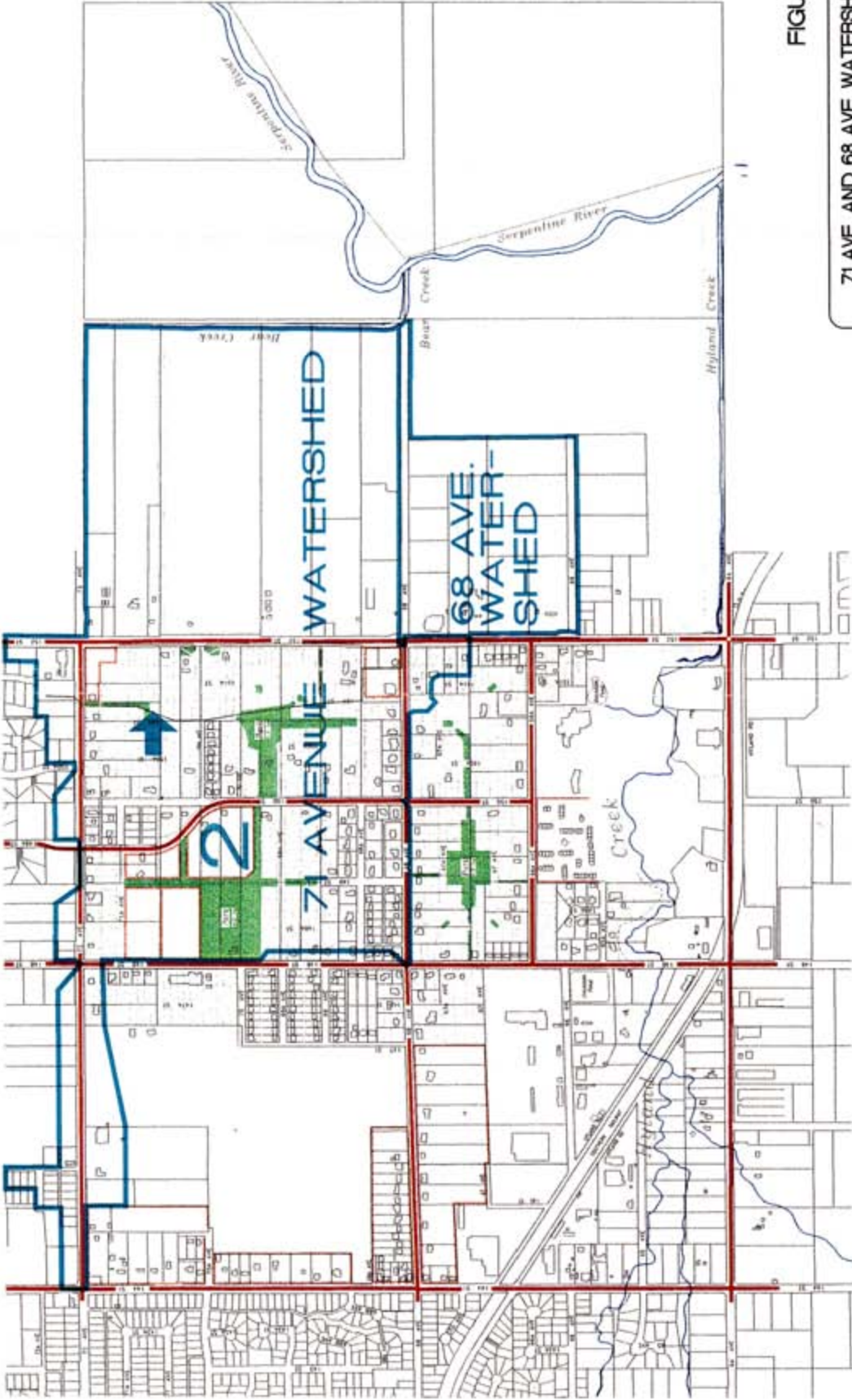
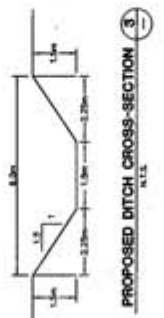
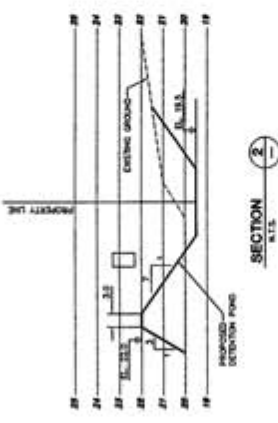
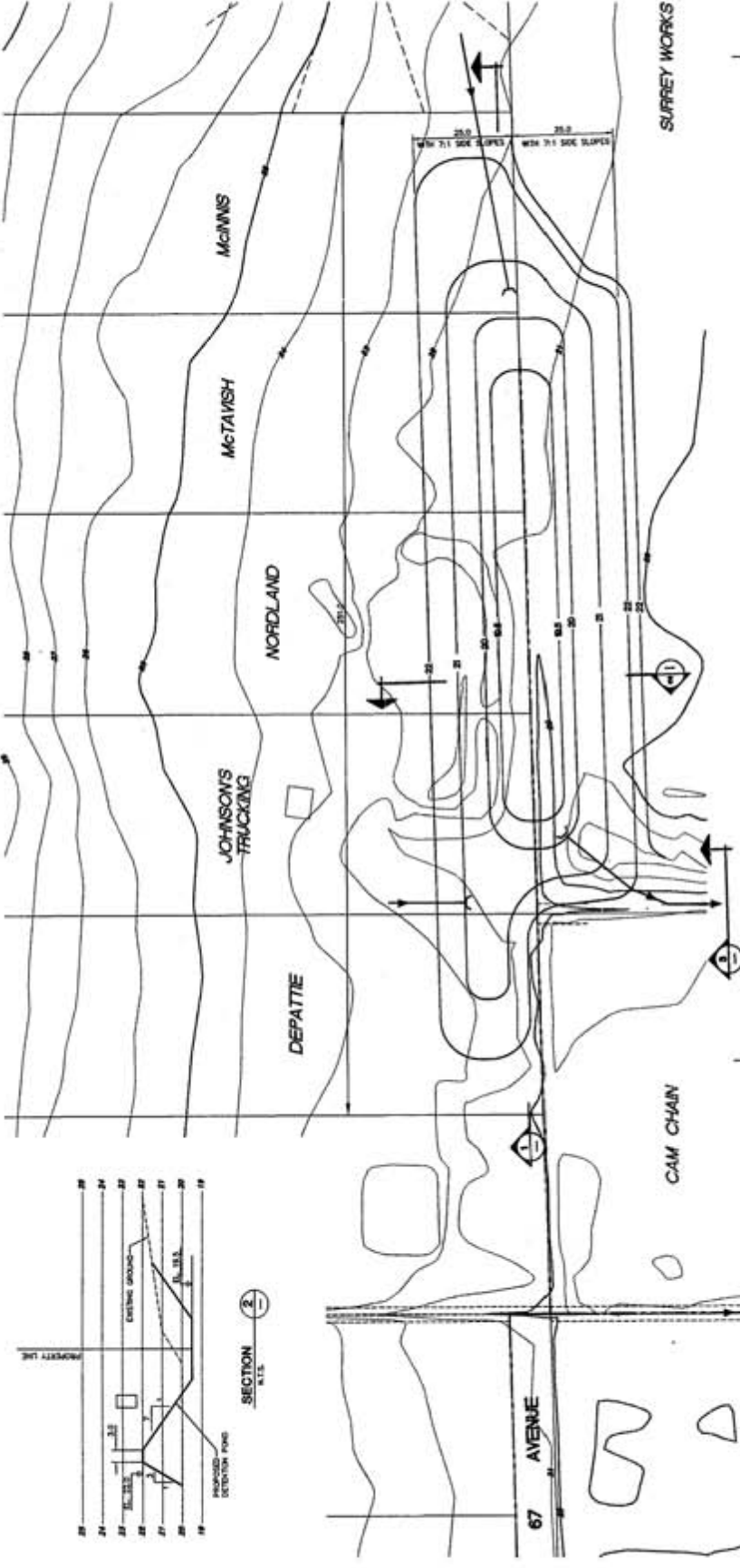



FIGURE D-1

71 AVE. AND 68 AVE. WATERSHED

NEIGHBOURHOOD CONCEPT PLAN  
 East Newton, South Neighbourhood  
 City of Surrey





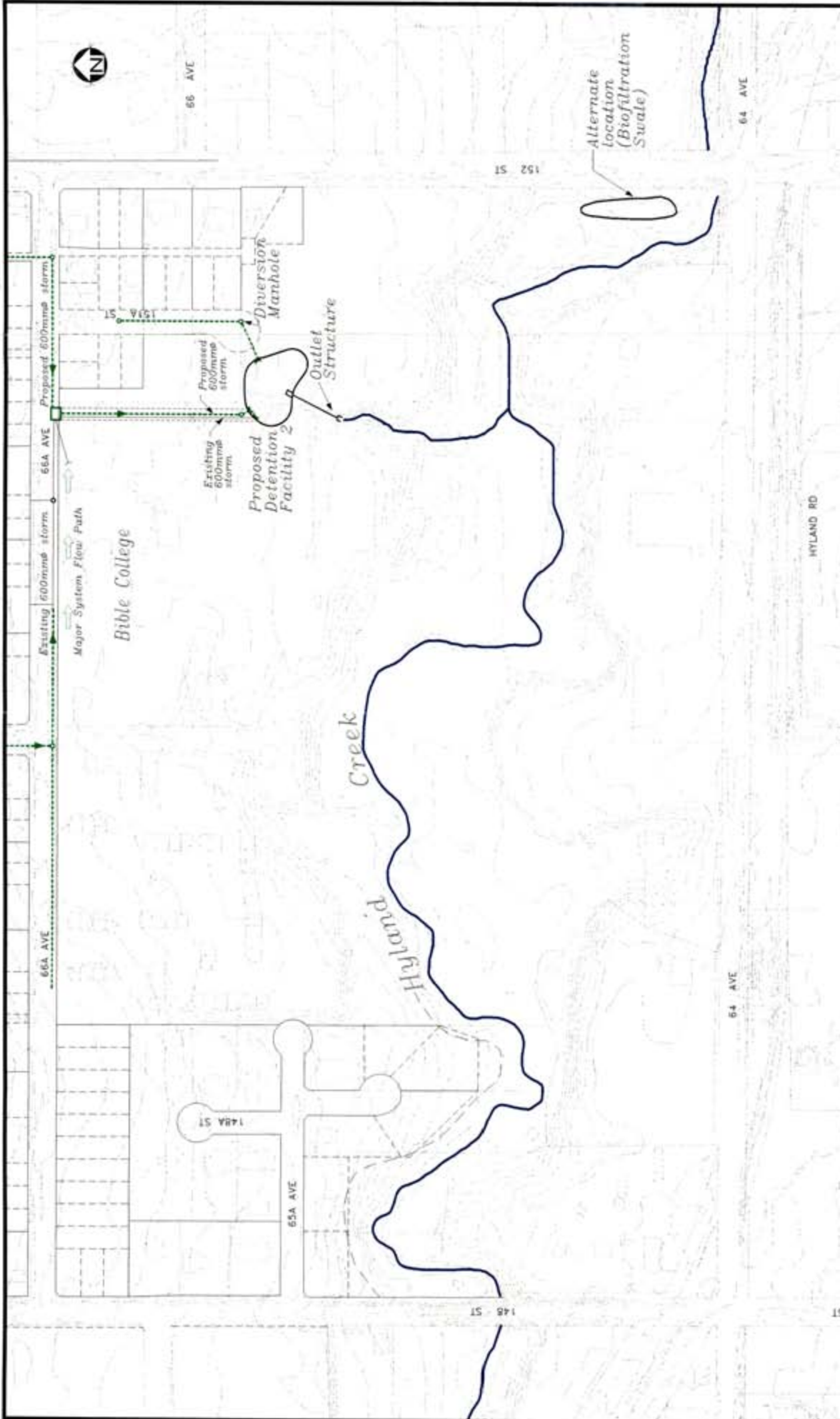


**UMA Engineering Ltd.**  
Engineers & Planners  
Water Utilities    Streets    Storm Drainage  
Transportation    Sewer Treatment    Urban Planning  
300 Moore Avenue, North, A.C.  
Tel: 250-886-1011

**CITY OF SURREY**  
EAST NEWTON  
DETENTION FACILITY #1

97/04/28    SCALE: NTS    1366-037    FIGURE D-2





 <p><b>UMA Engineering Ltd.</b>          Engineers &amp; Planners          2000 University Ave. Suite 100          Vancouver, BC V6T 1C6          Phone: 604.273.8888          Fax: 604.273.8889</p>	<p><b>CITY OF SURREY</b>          EAST NEWTON          DETENTION FACILITY #2</p>		<p>August 2007</p>	<p>SCALE: NTS</p>	<p>1398-007</p>	<p>FIGURE D-3</p>
	<p>HYLAND RD</p>					

BEAR CREEK (150th STREET)

NEIGHBOURHOOD CONCEPT PLAN			
Red Steeles South Neighbourhood City of Surrey Final Draft (Preliminary Recommendations)			
STATION	SCALE 1:500	DATE 2012	FIGURE 12-4



72nd AVENUE

152nd STREET

MR. PAUL BISHA

MR. J. PAUL BISHA

MR. J. PAUL BISHA

MR. J. PAUL BISHA

MR. J. PAUL BISHA

MR. J. PAUL BISHA

PROPOSED 14m  
ELECTRIC WORKING SPACE

PROPOSED 12m  
ELECTRIC WORKING SPACE

PROPOSED 8m  
ELECTRIC WORKING SPACE

PROPOSED 8m  
ELECTRIC WORKING SPACE

10.5m SANITARY

10.5m SANITARY

10.5m SANITARY

10.5m SANITARY

10.5m SANITARY

10.5m SANITARY

UTMS

## **Appendix E - Amenity Contributions**

- Cost Estimates

# East Newton South Neighbourhood

## Cost estimates, Public Amenities, Parks & Recreation

Description	Quantities	Cost
<b>Joint School Park site</b>		
Soccer field	4.00	\$80,000.00
Baseball diamond		\$250,000.00
Benches and tables		\$200,000.00
Bike rack	10	\$9,000.00
Landscaping	2	\$1,000.00
Signage		\$35,000.00
<b>Neighbourhood Park</b>		\$5,000.00
Benches and tables	3.95	\$79,012.35
Playground	10	\$9,000.00
Signage		\$20,000.00
<b>Neighbourhood Park</b>		\$1,500.00
Benches and tables	4.69	\$93,827.16
Playground	10	\$9,000.00
Signage		\$20,000.00
<b>Walkways (square m)</b>		\$1,500.00
6 m wide	3610	\$79,420.00
16 m wide		
Fencing	385	\$19,250.00
Bike baffle	12	\$12,000.00
<b>Green corridor 25 meter wide</b>		\$68,400.00
<b>Arborist services</b>		\$3,500.00
<b>Public consultations</b>		\$9,000.00
<b>Total</b>		<b>\$1,005,409.51</b>

## **Appendix F - UNIT RATES**

- City of Surrey Unit Rates
- Land Rates



# CITY OF SURREY

## Engineering Department

14245 - 56 Avenue, Surrey, British Columbia, Canada V3X 3A2

Phone: (604) 591-4175

Fax: (604) 591-8693

### FACSIMILE TRANSMITTAL FORM

**TO:**

Name: All NCP Consultants

Company: \_\_\_\_\_

Fax No.: (604)  
(area code)

Phone No.: (604)  
(area code)

**FROM:**

Name: Chris JA Whitlock

Title: NCP Coordinator

File No.: 2350-000

Date: Feb 16, 1996

Total Number of Pages: 2  
(including cover page)

Original to Follow: Yes:

By Mail:

By Courier:

No:

**COMMENTS:** RE: Unit Rates for Roads/Utilities within NCP areas

Please use the following rates for NCP Road cost estimates within your Stage 2 financial section (includes Engineering, Administration, Taxes):

Sidewalk	\$50/m
Concrete Curbing	\$25/m
Boulevard Strip	\$14/m
Pavement Widening	\$30/sq.m.
Streetlights and Conduit	\$100/m
Asphalt Overlay	\$6/sq.m.

<b>RECEIVED</b>		
UMA ENGINEERING LTD. BURNABY, B.C.		
FILE No. _____		
FEB 16 1996		
DISTRIBUTION		
NAME	INIT	DATE
<i>[Signature]</i>		

Unit Rates for Sanitary/Storm/Water are attached. Please call with any questions you may have.

Best Regards  
Chris JA Whitlock

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**1995 Unit Rates**

Pipe (mm)	Sanitary & Storm Construction Cost Only*	Sanitary & Storm +50%**	Pipe (mm)	Water Construction Cost Only	Water +50%**
250	\$240 /m	\$360 /m	200	\$250 /m	\$375 /m
300	\$250 /m	\$375 /m	250	\$260 /m	\$390 /m
375	\$290 /m	\$435 /m	300	\$280 /m	\$420 /m
450	\$320 /m	\$480 /m	350	\$310 /m	\$465 /m
525	\$340 /m	\$510 /m	400	\$320 /m	\$480 /m
600	\$380 /m	\$570 /m	450	\$350 /m	\$525 /m
675	\$420 /m	\$630 /m			
750	\$510 /m	\$765 /m			
900	\$620 /m	\$930 /m			
1050	\$720 /m	\$1,080 /m			
1200	\$840 /m	\$1,260 /m			
1350	\$970 /m	\$1,455 /m			
1500	\$1,110 /m	\$1,665 /m			

\* Construction Cost is the estimated cost to supply and install per meter the required pipe.

Peripherals such as catchbasins, manholes, tees, hydrants, valves, house services, restoration, rehab., etc. are included. Major Facilities such as Diversion structure, PRV stations, Lift stations, etc. are not included.

\*\* A 50% factor is used to cover all other costs including GST, design & admin., project contingency, etc.

For all NCP's, this 50% factor must be applied to generate total cost estimates and the basis for funding requirements.

The following land rates have been used in the cost estimates:

- Residential \$750,000/ha (\$300,000/ac)
- Townhouse \$990,000/ha (\$400,000/ac)
- Industrial (Worksyard) \$800,000/ha (\$325,000/ac)
- Agricultural \$50,000/ha (\$20,000/ac)
- Institutional \$800,000/ha (\$325,000/ac)  
(Religious Academy)