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A Neighbourhood Concept Plan for West Newton/Highway 10

July 28, 2004

A New Residential Community in West Newton

CITY OF SURREY – PLANNING AND DEVELOPMENT DEPARTMENT

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Part I: Background

1. Context

The West Newton/Highway 10 Neighbourhood Concept Plan area is located immediately north of Highway 10, and forms the southerly extent of the West Newton Community (*Figure 1*). The Plan area is immediately north of the West Panorama Ridge community, which is a permanent Suburban neighbourhood. Several existing, mature neighbourhoods consisting of primarily detached single-family residential uses describe the area immediately to the north of the Plan area. These include Boundary Park to the northwest, Panorama Park to the north, and Heritage Woods to the northeast. These established neighbourhoods provide an important context for the Plan area.

Although surrounded by urban uses to the north, the West Newton/Highway 10 Plan area has not been subject to urban development due to the lack of municipal services.

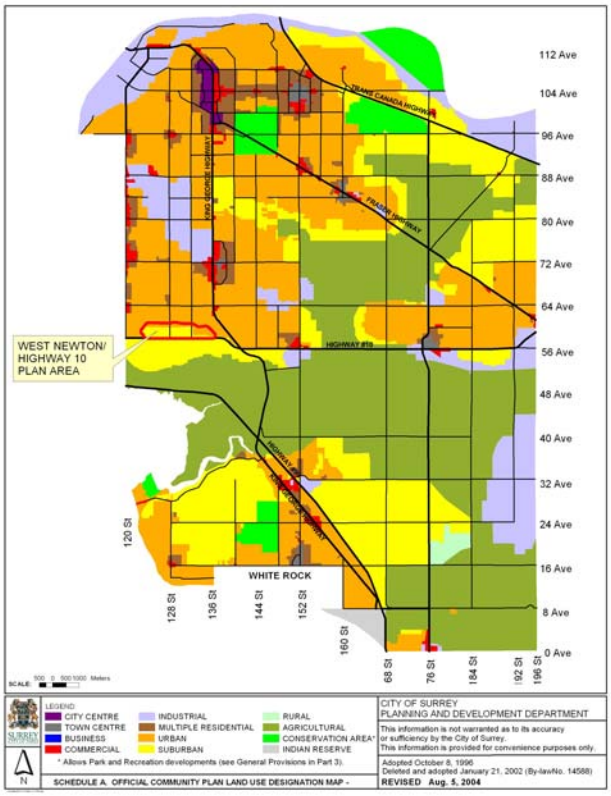


Figure 1 - The West Newton/Highway 10 Area in Surrey

2. The Plan Area and the Study Area

The West Newton/Highway 10 Study Area is bounded by 61 Avenue to the north, Highway 10 to the south, 123 Street to the west, and 136 Street to the east. For planning purposes, this larger study area was identified to ensure that the resulting Neighbourhood Concept Plan ("NCP) would be compatible with, and integrated into the surrounding area (*Figure 2*). Options for future land uses were developed encompassing the entire study area.

The West Newton/Highway 10 study area consists of approximately 100 hectares (250 acres) of land, currently designated for a mix of Urban and Suburban uses in the Official Community Plan ("OCP"). Approximately one-third of the area is designated Urban with the remaining area designated Suburban.

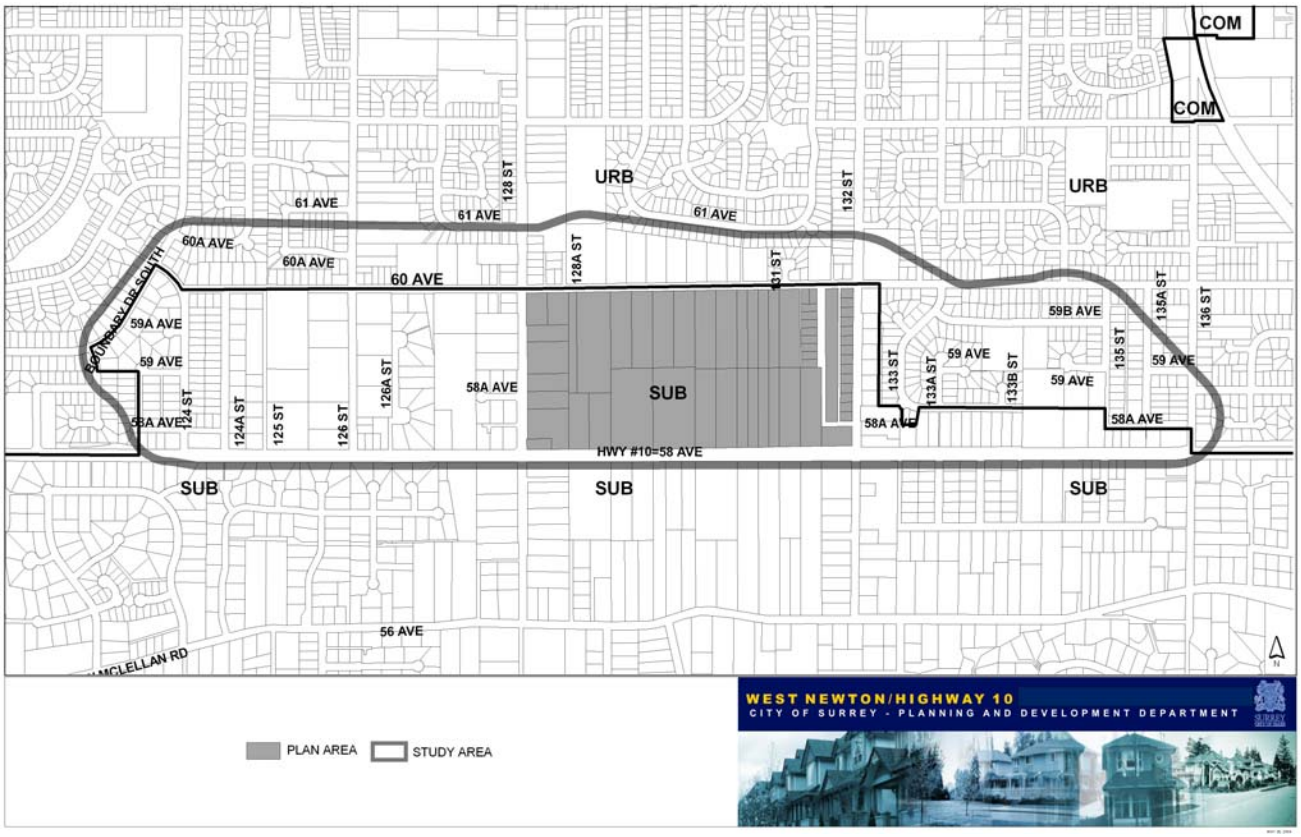


Figure 2 - The Plan and Study Areas

3. Initiation of the West Newton/Highway 10 Plan

In February 2002, a delegation to City Council representing the majority of properties located in the area bounded by Highway 10, 60 Avenue, 128 Street, and 132 Street requested that the City prepare a neighbourhood plan for the properties in that area. It was noted that the proposed study area contained a number of large properties that have remained underdeveloped due to the lack of municipal services. Council received the delegation and adopted the following resolution:

> "That the Planning & Development Department consult with the neighbourhood regarding the preparation of a Local Area Plan for the area and report back to Council on the matter."

At its Regular meeting of April 8, 2002 Council considered Corporate Report No. R068 and authorized the Planning & Development Department to proceed with a planning process to prepare an NCP for the subject area and approved the Terms of Reference for such a process. On January 26, 2004, Council approved the recommendations of the Stage I NCP report (*Appendix VII*).

4. Opportunities and Constraints

Current Land Use

The area is characterized by large, unserviced properties, as well as smaller lots with existing single-family dwellings on septic fields. The area contains several churches and a fire hall. It is served by three (3) elementary schools: J. T. Brown (west of 128 Street on 60 Avenue), Panorama Park (east of 128 Street on 62 Avenue) and North Ridge (at 135 street on 62 Avenue).

As growth has continued in the Newton community, there has been significant interest by numerous individuals and development companies in the West Newton/Highway 10 area. There have been a variety of proposals for detached, single-family development, in keeping with the overall character of surrounding neighbourhoods. However, the existing Suburban designation and lack of municipal services have created an impediment to development.

Given the size and context of the study area, and its limited access to Highway 10, it is not large enough to be planned as a complete community to accommodate opportunities for workplaces and business development. It is, however, considered a viable and logical extension of the residential land uses in the immediate area. There is an opportunity to provide a wider mix of residential

land uses and densities and two local commercial nodes that can serve the local neighbourhood and the broader community.

Transportation

Highway 10 is a Provincial Highway providing for the movement of goods and services within the City of Surrey and the region. Its alignment along the southerly edge of West Newton/Highway 10 forms a significant physical and visual barrier that influences the type and character of development that can be supported on the lands bordering the Highway.

The Ministry of Transportation is proceeding with a process to widen Highway 10 from 2 lanes to 4 lanes through the study area, and to add additional turn lanes at signalised and un-signalised intersections. The Ministry also intends to improve safety and roadway capacity by minimizing access to and from Highway 10. This includes proposals to close 124A Street and 125 Street at Highway 10 through the creation of cul-de-sacs in these locations.

128 Street and 132 Street are city arterial roads, which will eventually be widened to 4 lanes. Land will be protected for this ultimate condition.

60 Avenue is a major collector road, which will continue to have 2 travel lanes but will be widened to incorporate bicycle lanes and on-street parking.

To address local concerns about speeding and pedestrian safety on 124 Street, two traffic circles, one at 124 Street and 60 Avenue and one at 124 Street and Boundary Drive are proposed. Additional traffic calming options will be considered at the time of implementation, to coincide with other pedestrian improvement projects.

The City has retained a consultant to review the traffic conditions on 124 Street north of Boundary Park Drive to 64 Avenue (which is outside this NCP area) and to propose options for traffic calming. Part IV provides additional information on the proposed strategy for traffic calming in the area.

Sanitary Sewer

A large area between128 Street and 132 Street in the study area is undeveloped, and is serviced by private septic tanks. Suburban designated areas to the east and west of this central area also rely on septic fields. The existing 375 mm diameter trunk sewer on 123 Street is the designated trunk sewer for the plan catchment area, and is adequate to handle future sanitary flows from development within the study area. Details of all proposed sanitary sewers are

contained in the Engineering Servicing Report undertaken as part of this NCP planning process, and included in Part IV.

Drainage

A review of the past studies on storm water management in the area indicates that the previous analysis assumed the area to remain primarily Suburban in accordance with the Official Community Plan. As a result of the proposed land use plan the receiving storm sewers and downstream watercourses will be subject to an increase in peak flows, runoff volume and frequency. Significant storm water trunk sewers will need to be constructed along Highway 10 and downstream of the area. An analysis of the DCC revenues expected from the West Newton/Highway 10 NCP build-out shows that the storm sewer DCC revenues will be more than sufficient to cover the projected cost of the storm sewer works. The Servicing Report, therefore, recommends that these works be included in the City's 10-Year Capital Plan and DCC program to allow the works to be funded as part of the City's major infrastructure program.

Water

The water main network is fairly developed in the west and east portions of the study area where most existing developments are located. However, water mains exist only along major roads in the central portion between 128 Street and 132 Street. New water mains will be required to service the ultimate needs of the study area. A number of water mains are already in the City's 10-year capital plan. The water mains required at Highway 10/124A Street and 128 street/60 Avenue, however, are not currently in the capital plan and DCC program. The Servicing Report recommends that these works be added to the City's infrastructure program.

Tree Preservation

The Plan area contains significant stands of trees, many of which consist of closed stands of Douglas Firs, which have been growing in a sheltered state with the trees relying on each other for support. Unless these stands of trees are preserved in large undisturbed areas, the chance of an individual tree surviving is minimal and such trees could pose a hazard. There is opportunity to preserve portions of these treed areas as amenities within parks. The Land Use Plan proposes two parks, to the east and west of 128 Street, balancing tree preservation with the requirements for active community parks.

The park west of 128 Street, proposed primarily to be a passive park, provides opportunity to preserve a large number of trees. The park east of 128 Street is

proposed to be an active community park. It is expected that the loss of trees will be compensated to a degree by the planting of new trees.

Additionally, there is an opportunity to preserve significant trees in the vicinity of Highway 10 as part of a landscaped buffer along the highway. Opportunities to preserve other significant trees, whether as individual trees or in groups including the group of red cedar trees to the southeast of 60 Avenue and 128 Street, will be explored through consideration of development proposals. At the time of development proposals, the clustering of dwelling units or innovative layouts will be encouraged in order to preserve significant trees. *Appendix I* documents the tree preservation opportunities and strategy.

5. The Planning Process

The process leading to the preparation of a plan for West Newton/Highway 10 commenced in February 2002 with a delegation of property owners from the area approaching Surrey City Council and requesting preparation of a neighbourhood plan.

Following the approval of the Terms of Reference for the NCP in April of 2002, a Citizens Advisory Committee ("CAC") was established, comprised of representatives of the property owners in the area. The mandate of the CAC was to liase with other owners in the area and bring the concerns and issues of the property owners to the table and provide comments to staff on the land use options. Also, a committee was formed including representatives from the Engineering and Parks, Recreation & Culture Departments and external agencies such as BC Hydro, School District, Ministry of Transportation, Ministry of Water, Land and Air Protection and Department of Fisheries and Oceans.

Public input into the planning of the area was achieved through Public Open Houses. Four Public Open Houses were held between June 2002 and November 2003. In June 2003, three land use options were presented to the public for comments and selection of a preferred option. In November 2003, staff presented the preferred land use option with modifications based on the comments received at the previous Open House. A preliminary servicing strategy was also presented for comments. Following comments from the public, the land use plan was further refined in consultation with CAC and stakeholders and in December 2003, it was sent to Council for approval as Stage I of the Neighbourhood Concept Plan. Council was advised of four outstanding land use issues, which needed to be addressed prior to completion of the next stage of the plan. Council approved the land use plan in January 2004 and instructed staff to address the outstanding land use issues and proceed with the completion of an implementation strategy including the servicing, financing and phasing strategy and determination of amenity contribution requirements to implement the land

use plan. An additional land use issue surfaced after Council's approval of the Stage I plan as a result of a proposal by a property owner to change the land use designation of their properties.

In May 2004, staff held the final CAC meeting to present recommendations on the outstanding land use issues, the proposed servicing, financing and phasing strategy and amenity contributions. Following the CAC meeting, the final Public Open House was held on May 26, 2004 to present recommendations on the land use issues, proposed revisions to the land use plan, implementation strategy and other information on the plan.

The following is the list of major steps in the planning process leading to the completion of Stage II for consideration by Council for final approval:

1. A delegation and petition received by Council from property owners (representing 64% of the owners and 72% of the land within the area bounded by Highway 10, 60 Avenue, 128 Street and 132 Street) to request authorization for the preparation of a Neighbourhood Concept Plan (February 2002);

2. Council approved Terms of Reference for the preparation of the plan (April 2002);

3. Public Open House #1 - Background information, issues, opportunities and constraints, land use and planning objectives (June 2002);

4. Citizens Advisory Committee formed (November 2002);

5. Public Open House #2 - Preliminary land use options and selection of a preferred land use option (June 2003);

6. Public Open House #3 – Review and comment on the preferred land use option and preliminary servicing and transportation management strategy (July 2003);

7. Public Open House #4 – Review and comment on the proposed final land use option (November 2003);

8. Corporate Report to Council (December 2003);

9. Council approved the Land Use Plan - Stage I (January 2004);

10. Public Open House #5 (Final) – Review and comment on staff recommendations on the outstanding land use issues and proposed

revision to the land use plan, servicing, financing and phasing strategy and amenity contributions (May 2004); and

11. Final and complete Stage II Neighbourhood Concept Plan to Council for approval (July 2004).

Before each public open house, staff held meetings with both CAC and stakeholders to discuss results of the previous open house and the actions taken in response to the public comments and concerns.

Part II: Planning Objectives, The Land Use Plan and Policies

1. PLANNING OBJECTIVES

On the basis of public input, the following objectives were formulated to guide the preparation of the West Newton/Highway 10 Neighbourhood Concept Plan:

- To develop and formulate land use and other development policies to guide development proposals in the area;
- To encourage sustainability and develop a plan which enhances quality of life;
- To identify and enhance environmentally sensitive areas, such as significant vegetation;
- To prepare a parallel servicing strategy that identifies the appropriate location, staging and standard of services required to support the land use plan, including sanitary sewer, water, drainage, roads and other utilities and methods of implementation by rezoning, subdivision, or other mechanisms;
- To undertake a financial analysis that will demonstrate adequate funding for the implementation of the servicing plan;
- To ensure compatible interfacing and provide buffers to achieve appropriate density and land use transition with the existing neighbourhood
- To develop an appropriate landscape buffer and maintain the Suburban character along Highway 10
- To complete proper planning and secure financial commitments through the development approval process to achieve an appropriate level of community services and amenities, including schools, parks, fire, police and library services to serve this community; and
- To ensure adequate and meaningful public consultation in the planning process.

Surrey's Official Community Plan requires that all local area plans and neighbourhood concept plans reflect the policies and directions of the Official Community Plan. Therefore, the Land Use Plan for West Newton/Highway 10 is also guided by the following City-wide objectives as expressed in the Official Community Plan:

- Encourage growth and development that effectively utilizes land and City resources
- Create orderly and cost-effective development by promoting a complete urban community
- Support a compact urban development pattern and create an identifiable neighbourhood by ensuring proper planning for schools, parks and stores
- Provide a balanced range in choices in the type, tenure and cost of housing;
- Create a safe, attractive and people-friendly environment through the promotion of CPTED (Crime Prevention Through Environmental Design) principles; and
- Locate services and facilities close to neighbourhoods in order to minimize travel to larger commercial areas.

2. THE LAND USE PLAN AND POLICIES

The Land Use Plan for the West Newton/Highway 10 area is shown in *Figure 3*. It is planned as an extension of the West Newton South Neighbourhood Concept Plan, where single family residential development is the primary land use. The land uses proposed at the interface with the existing residential development are compatible in density and character with the adjacent residential uses. The Land Use Plan creates three areas of distinct character. Two areas, the area to the west of BC Hydro corridor and the area to the east of 132 Street, are primarily single family residential with the vacant/underdeveloped parcels designated for residential uses compatible with the existing residential uses on the surrounding parcels. The third area between BC Hydro corridor and 132 Street is designated predominantly for small lot single family residential with a small portion designated for local commercial and for multiple residential including seniors housing.

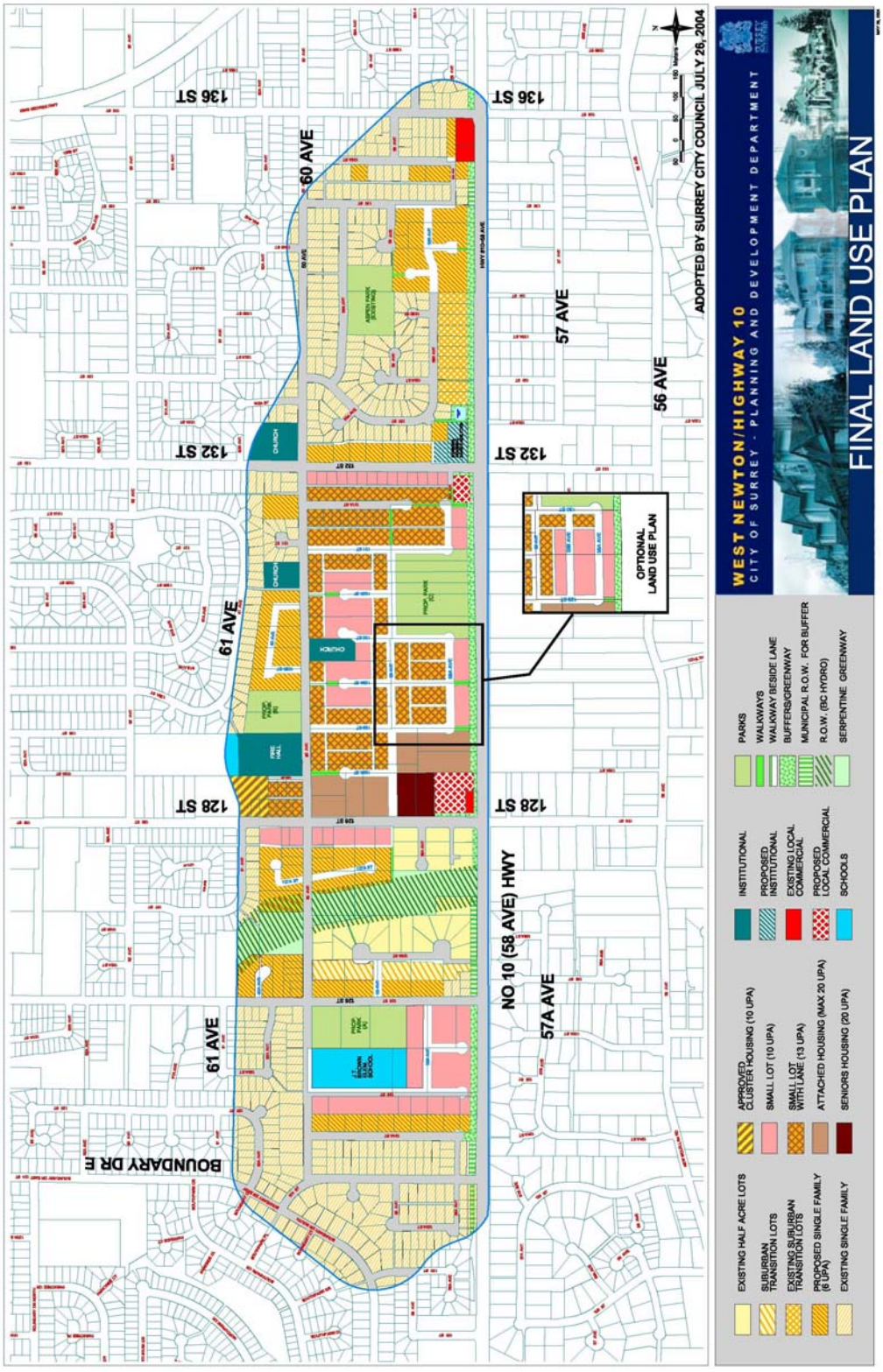


Figure 3 - The Land Use Plan

2.1 Residential

The Land Use Plan shows single family residential at a variety of densities as the most dominant land use. Such residential uses range from Suburban Transition Lots (at a density of between 2 units per acre to 6 units per acre) to conventional Single Family Lots (at 6 units per acre) to Small Lots (at 10 units per acre) to Small Lots With Lanes (at 13 units per acre). The Suburban Transition Lots designation proposed to the west of 126A Street is intended to provide a transition between the existing half-acre lots to the east and proposed conventional single family lots to the west on 126 Street. Therefore, the size, particularly the width, of the suburban transition lots should be compatible with that of the half-acre lots. A width of between 25 to 30 metres achieved through a Comprehensive Development Zone is considered appropriate for these lots.

An option is shown for a portion of the Land Use Plan between 59 Avenue, 129 Street, 58A Avenue and 130 Street. This option shows an east-west road pattern, with the designation of Small Lots With Lanes (13 units per acre) facing 59 Avenue and 130 Street and the designation of Small Lots (10 units per acre) in the remaining area. Both the proposed Land Use Plan and the Optional Land Use Plan are acceptable.

The Land Use Plan within the central area between 128 Street and 132 Street shows a majority of the single family lots with rear lanes. Vehicular access to these lots should be provided from the rear lanes. The intent is to achieve a pedestrian friendly streetscape within this central area. This area, which contains large underdeveloped properties, has the greatest potential to create pedestrian friendly streets in keeping with the Official Community Plan policies.

The Land Use Plan also provides opportunities for multiple residential land uses at a density of 20 units per acre, which includes a location for Seniors Housing. The developments under this designation should take the form of townhouses designed to be compatible with the single family residential development in the area. The maximum density proposed falls between the 15 units per acre density of the RM-15 Zone and 30 units per acre density of the RM-30 Zone. Site-specific Comprehensive Development Zones will need to be prepared to allow development at 20 units per acre.

The Land Use Plan, when fully implemented, is expected to generate 950 new residential units resulting in an additional population of approximately 2,880 people. The total population of the area at build-out is expected to be between 4,200 to 4,500 people (*Figure 4*).

West Newton / Highway #10 - Local Area Plan Build-out Estimates

Proposed New Development

(At Maximum Allowable Density)

Residential Uses	Land Area (Acres)	Density (upa)	Dwelling Units	Population	Business Floor Area (ft^2)
Single Detached 6 upa	33	6	200	660	
Single Detached Small Lot 10 upa	22	10	220	700	
Single Detached Cluster 10 upa	3	10	30	100	
Single Detached Small Lot with Lane 13 upa	24	13	310	990	
Attached Housing 20 upa	8	20	150	390	
Seniors' Housing 20 upa	2	20	40	40	
Total Residential	**92**		**950**	**2,880**	
Other Uses		(FAR)			
Local Commercial	2	0.5			52,000
Institutional	1				
Park	16				
Buffer	8				
Detention Pond	0				
Other Uses Total	**27**				**52,000**

Existing / Retained Development within Plan Area

Urban Single Detached	63		340	1,260	
Suburban Single Detached	33		96	360	
Suburban Single Detached Transition	8				
Commercial	1				9,000
Park	4				
School	5				
Church	5				
Fire Hall	4				
ROW Greenway	11				
Existing Development Total	**134**		**436**	**1,620**	**9,000**
Local Area Plan Totals	**253**		**1,386**	**4,500**	**61,000**

Total Land Area Excludes Roads

Figure 4 - Build Out Estimates

Residential Policies

1. Opportunities should be provided for a variety of housing types and a range of lot sizes to create a diversity of housing options.

2. The type and density of new residential development at the interface with the existing residential development should be compatible with the type and density of the existing residential uses and should provide a reasonable transition between the existing and higher density residential land uses.

3. In the existing established single family residential areas, the character of the new single family houses should be compatible with the character of the existing houses. In the new residential areas, the form and character of the single family residential developments should continue to be established through character studies/statements and design guidelines implemented through building schemes.

4. The form and character of multiple residential developments should be established on the basis of the contextual relationship of the site with the surrounding area and the Development Permit Guidelines of the Official Community Plan.

5. Along Highway 10 where a landscaped buffer is proposed, alternative land use options may be considered to maximize the development potential of lands that are affected by the buffer and highway widening subject to compatibility and interface with the surrounding land uses being adequately resolved.

6. Multiple Residential housing should be located in the proximity of commercial nodes.

7. The character of the multiple residential development should be compatible with the character of the predominantly single family residential area.

8. On the multiple residential sites with existing mature trees considered worthy of preservation, buildings should be clustered to maximize opportunities for tree preservation.

9. In the residential developments next to Highway 10, noise abatement measures are to be incorporated in the design and construction of the buildings and outdoor spaces, with emphasis on those buildings and outdoor spaces that are located immediately next to Highway 10, regardless of whether or not they are separated by a landscaped buffer from the highway. The noise abatement measures should be based on CMHC guidelines (Road and Rail Noise: Effects on Housing, NHA 5156 08/86) and/or on the recommendations from an acoustical consultant.

10. Within the central area, between 128 Street and 132 Street, streetscapes are to be pedestrian friendly, with emphasis on 59 Avenue, 129 Street, 130 Street in front of the community park, 131 Street and, in the case where the optional land use plan is implemented, 58B Avenue. The following characteristics are considered appropriate to achieve pedestrian friendly streetscapes and should be incorporated to the greatest extent possible:

    - Driveway access to single-family residential lots is provided from rear lanes, regardless of whether the lots are narrow/deep or wide/shallow, and to multiple residential units from the interior of the site.

    - On lots where vehicular access is not from rear lanes, buildings are to be designed such that garages do not dominate the building fronts or are recessed back from the building fronts. Driveways are to be paired or

shared between two adjoining lots and on corner lots, driveway access to the garage is provided from the flanking street.

- Curb extensions at key intersections and pedestrian crossings and on-street parking pockets are provided. *Figure 5* is a conceptual plan showing the proposed locations for curb extensions and on-street parking pockets.

- Porches and verandas are provided at the building fronts, with the main floors raised by 2 to 4 ft. from the sidewalk level to provide privacy and allow for casual surveillance of the street from the porches/verandas and building interior.

- The absence of fences along the lot lines abutting streets. Where fences are provided, they are low, transparent and set back from lot lines with landscaping in front of the fence.

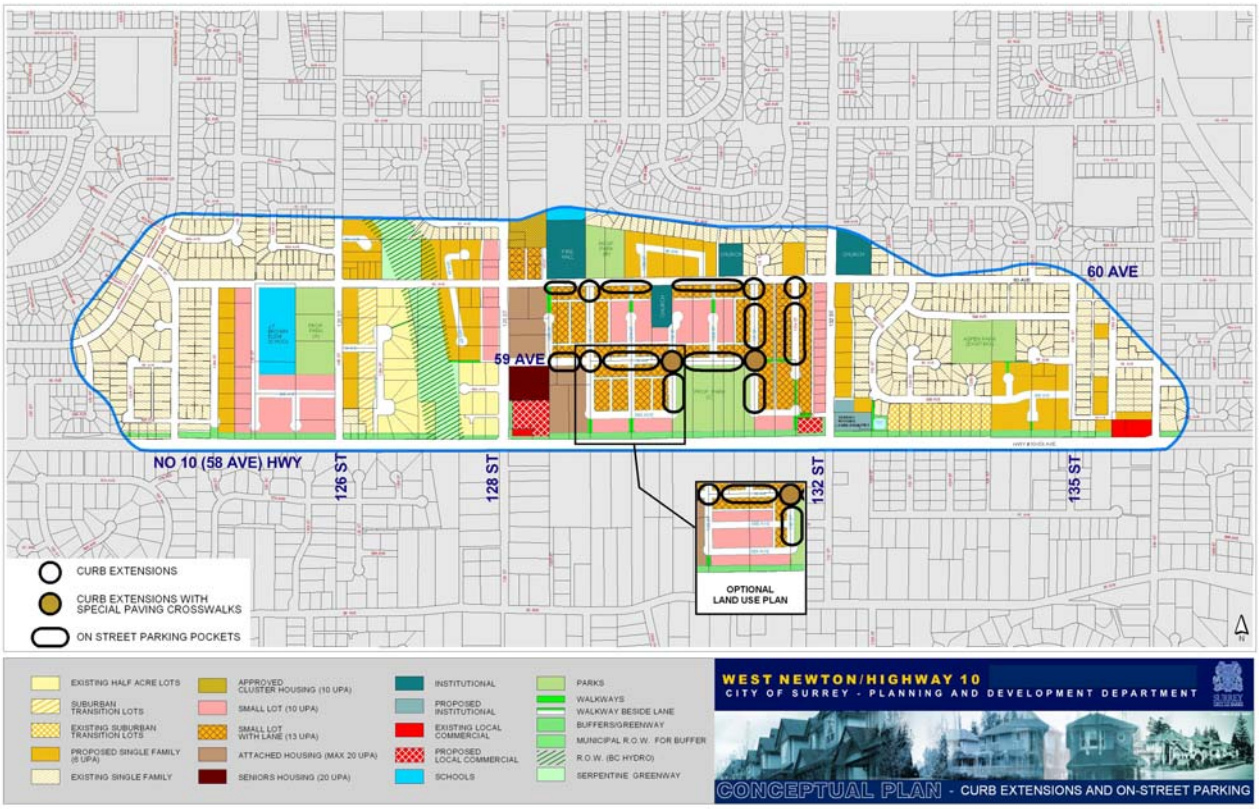


Figure 5 - Curb Extensions and On-Street Parking

2.2 Commercial

The Land Use Plan proposes two areas with Local Commercial Designation in addition to the existing commercially zoned property at Highway 10 and 136 Street. The primary purpose of the Local Commercial areas is to provide for the day-to-day retail and personal service needs of the immediate neighbourhood areas within walking distance of the commercial stores. This would provide an opportunity to reduce dependence on cars for the day-to-day shopping needs. The two proposed Local Commercial areas are:

1. Northeast Corner of Highway 10 and 128 Street

This commercial area is proposed as an expansion of the existing commercial node, which contains a gas station and convenience store. The total designated area is 1 hectare (2.5 acres) to allow for the road dedication anticipated for Highway 10 widening, future redevelopment of the existing commercial and addition of other neighbourhood commercial uses (based on C-4 or C-5 Zones) to serve the projected population in the area. Besides being convenient to the commuter traffic on highway, its location is also within convenient walking distance of most homes (i.e., within 400 metres (1/4 mile) of the commercial node).

2. Northwest Corner of Highway 10 and 132 Street

This commercial node is purposefully kept small to allow only small-scale local commercial uses to provide service to the immediate area. To address concerns about the traffic impact and land use compatibility, uses such as gas stations, 24-hour convenience store or neighbourhood pub are not envisioned at this location.

The two parcels in the existing commercial node at Highway 10 and 136 Street are currently zoned CD and CHI for highway commercial uses (carwash and consignment store). In addition to the two proposed commercial nodes, the Land Use Plan also designates the existing node for Local Commercial uses. The existing businesses can continue to operate for the foreseeable future. When a change to the existing zoning is considered in the future, the rezoning should be in favour of neighbourhood-oriented commercial in keeping with the plan designation to provide services to the immediate neighbourhood.

Commercial Policies

1. To ensure that the commercial nodes primarily accommodate small scale, local commercial uses to service the immediate neighbourhood, the commercially designated areas should not be expanded.

2. Opportunity to develop the commercial node at Highway 10 and 128 Street as a neighbourhood centre and focus should be explored. Elements such as a small plaza on 128 Street and placement of special landscaping and urban design features at the corner should be considered at the time of redevelopment to mark the entrance to the neighbourhood.

3. Building designs should be developed in keeping with the surrounding predominantly residential character.

2.3 Institutional

The Land Use Plan shows five sites designated Institutional. Four of the five sites contain existing institutional uses (three churches and a fire hall), all on 60 Avenue. The remaining Institutional designated site is at the northeast corner of Highway 10 and 132 Street. The purpose is to allow for the construction of a seniors care facility, which would provide an opportunity for ageing residents to continue to live in the neighbourhood. In addition to these institutional uses, the area also contains an elementary school and is within the catchment boundaries of three other schools. In response to the property owners concerns about the traffic and noise impacts and the concern that designating their properties will restrict development potential, the Land Use Plan does not identify any additional specific sites for Institutional uses. The Official Community Plan, however, does allow institutional uses in most land use designations.

Institutional Policies

1. Institutional uses should be located at the intersections of major roads to allow efficient dispersal of traffic.

2. Prior to allowing institutional uses, including sites designated Institutional, adequate public consultation should be undertaken, in addition to the statutory requirement for a public hearing for rezoning applications.

3. The issues of interface compatibility and transition treatments with the surrounding predominant single family residential development should be resolved through the siting and design of buildings and landscaping.

2.4 Parks, The Serpentine Greenway and Highway 10 Buffer/Greenway

Parks

In addition to the existing park (Aspen Park) in the easterly portion of the area, the Land Use Plan shows three new sites designated Park. The three new parks comprise a total area of approximately 5 hectares (16 acres). They are:

1. Park (A), at the southwest corner of 60 Avenue and 126 Street adjacent to J. T. Brown Elementary School. This park has an area of approximately 2 hectares (5 acres). It will be developed primarily as a passive neighbourhood park because a substantial part of the park is covered with existing mature trees.

2. Park (B), to the east of the existing Fire Hall on 60 Avenue, which is located to the south of Panorama Park Elementary School. This park has an area of approximately 1.2 hectares (3 acres). It is proposed as an active neighbourhood park with playfields.

3. Park (C), between 59 Avenue, Highway 10, 130 Street and 131 Street. This park has an area of approximately 3 hectares (7.5 acres). It will be developed as an active community park, which will include playfields and a children's playground. A 15 metre wide landscaped buffer will be provided along Highway 10, which will mitigate the impacts from the highway traffic.

The Serpentine Greenway

The Land Use Plan shows the Serpentine Greenway along and within the BC Hydro Right-of-Way, which traverses the area. The City, as part of a long-term acquisition strategy, has already acquired some of the land within this right-of-way for the greenway. The purpose of the Serpentine Greenway is to provide a multi-use recreation linkage between Newton and the Serpentine River. The City proposes to develop this greenway with monies collected from the development cost charges for park purposes.

Highway 10 Buffer/Greenway

Under the Border Infrastructure Program, a joint Provincial and Federal Initiative, plans are being finalized to upgrade Highway 10 to a four-lane highway, with the construction likely to commence in 2006. A 15-metre wide landscaped buffer is proposed along Highway 10 as a green edge along this regional route and to provide physical separation between residential developments and the highway that will reduce impacts related to the highway traffic on the adjacent

developments. The 15-metre width also provides an opportunity to incorporate a multi-use pathway within the buffer. This multi-use pathway, which will accommodate bicycle use in addition to pedestrians, will form part of Surrey's greenway system and core bicycle route network between Cloverdale and Newton. City Council has expressed a desire to achieve this buffer as soon as possible. The following strategy is proposed to implement the buffer and establish the east-west multi-use pathway:

- On those properties where there is full development potential in accordance with the Land Use Plan, the properties are large and a subdivision is proposed to create three or more new lots, the land acquired through the 5% park dedication should be part of the buffer and, as part of the application process, the City will purchase any additional land required to make up the 15-metre width.

- In the case where properties are small but there is some development potential for subdivision, the City should obtain a buffer as wide as possible by using a combination of 5% park dedication and land purchase strategies. Alternatively, the City could negotiate with the owner to have a right-of-way registered on the property for the buffer. Whether the buffer is acquired through dedication, purchase or provided through the registration of a right-of-way, the actual width of the buffer that can be obtained will depend on the site-specific situations such as the land needed for highway dedication and location of the existing buildings that the owner may wish to retain. In the event, the buffer is not wide enough to incorporate the multi-use pathway, a sidewalk should be provided within the Highway 10 right-of-way to maintain continuity of the multi-use pathway. In these instances, the Highway 10 Project Team of the Ministry of Highways has agreed to permit the construction of the sidewalk on the highway land.

- In cases where properties are small, have no development potential and the existing buildings are set too close to the highway to accommodate the 15m buffer without removal of the buildings, the buffer may be obtained through negotiating with the owners for the registration of a right-of-way based on the site-specific situation. Where acquisition of the buffer is not practical, a sidewalk should be provided within the Highway 10 right-of-way to provide continuity of the multi-use pathway. In these instances, the Highway 10 Project Team of the Ministry of Highways has agreed to permit the construction of the sidewalk on the highway land.

A preliminary analysis of the existing conditions along Highway 10 was completed based on aerial photography to determine the areas where the full 15-metre buffer may be difficult to achieve and the areas where registration of right-of-ways may need to be negotiated for continuation of the buffer. This is included as *Appendix II*.

The 15-metre width for the buffer is to be provided beyond the dedication required for Highway 10 and measured perpendicular to the edge of the dedication required for the Highway 10 improvements. The buffer will parallel the highway and include a 4-metre wide multi-use pathway with landscaped berms on each side. Where preservation of the existing trees is achievable, the berms may have to be modified or deleted. The landscaping of the buffer and construction of the pathway will be undertaken by the City, with funding from the park amenity contribution, that will be collected from each new lot or unit in the NCP area.

A conceptual cross section of the buffer is shown in *Figure 6*.

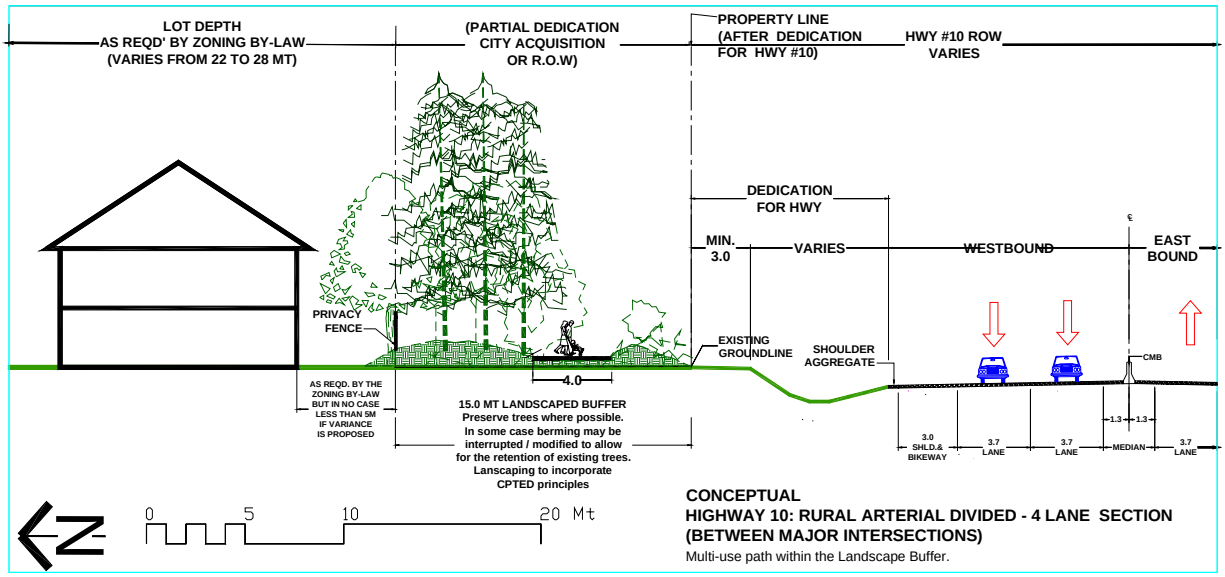


Figure 6 - Conceptual Cross Section - Highway 10 Buffer/Greenway

Highway 10 Buffer/Greenway Policies

1. The intent of the buffer is to retain a green edge and maintain suburban character along Highway 10. Therefore, preservation of the existing trees should be maximized by ensuring that any re-grading of adjacent development sites does not compromise the existing grading within the buffer area. Tree Preservation Plans and arborist's reports should be provided in keeping with the Tree preservation By-law. Where re-grading is proposed, the arborist's report should describe the impact on trees and include recommendations to mitigate the impacts to ensure the long-term survival of the trees. Where trees are being retained, the landscaped berms may be modified or discontinued to allow tree preservation.

2. The minimum setback required under the Zoning By-law should be applied to the dwelling units located next to the buffer, provided that in no case should the building setback from the buffer be less than 5 metres.

3. The 4-metre wide multi-use pathway should be a paved pathway, except where preservation of the existing trees and significant vegetation that the surface of the pathway be treated differently or be narrower than 4 metres.

4. The design and layout of the buffer should be based on the application of CPTED principles. Opportunities should be provided to maximize visual surveillance of the pathway from the highway traffic through strategies such as the following:

    - Provide a low berm on the highway side, which may be interrupted to allow visual penetration and planted with low shrubs separated by grassed areas or groundcover planting.

    - Select the plant material to allow good visibility of the pathway and other areas and keep the taller plants back from the pathway.

    - While the pathway may meander between trees and along berms, care should be taken to avoid creating hidden areas.

    - Develop a maintenance program to minimize opportunities for overgrowth of the trees and plant material and keep the pathway in good repair.

2.5 Schools

The West Newton/Highway 10 Plan area is within the catchment areas of three elementary schools:

- J. T. Brown (west of 128 Street on 60 Avenue);
- Panorama Park (east of 128 Street north of 60 Avenue); and
- North Ridge (west of 136 Street on 62 Avenue).

The Surrey School District, which was consulted throughout the plan preparation process, advises that a new elementary school is not required for this area since the additional number of students anticipated from the new growth in the area can be accommodated within the existing schools. The growth resulting from development in the Plan area will generate 15 additional students at the North Ridge Elementary, which is not considered to have a significant impact. However, significant student population growth is expected at Panorama Park Elementary (additional 200 students) and J. T. Brown Elementary (65 students). Both schools are at or near capacity currently. To address the expected student growth, expansions to both schools will be required and catchment boundary adjustments may also be necessary. The plan area is served by Tamanawis Secondary School (west of 128 Street on 68 Avenue), which is over capacity and has several portables. Additional 200 secondary students are anticipated from the plan area. However, a new secondary school at the previous Traditional School site (new Newton Area Secondary) to the southeast of 64 Avenue and 132 Street is expected to be open in 2006. The new school will absorb approximately 155 new students from the plan area. The remaining 45 students will attend the Tamanawis, which is expected to return to a student population below its capacity due to enrolment adjustments when the new school is operational.

2.6 Circulation

The plan area is bounded on the south by Highway 10, a Provincial Highway, which will provide some access via public streets to the Plan area. The area is served by two major north-south arterial roads (128 Street and 132 Street), a major collector road (60 Avenue) and a network of local roads. The proposed plan recognizes the existing pattern and hierarchy of roads and proposes a network of new local roads and improvements to the existing network of roads to serve the vehicle traffic that will be generated by the proposed development of the Plan area. The key improvements proposed in the area are:

- Traffic signals on 60 Avenue at 128 Street and 132 Street;

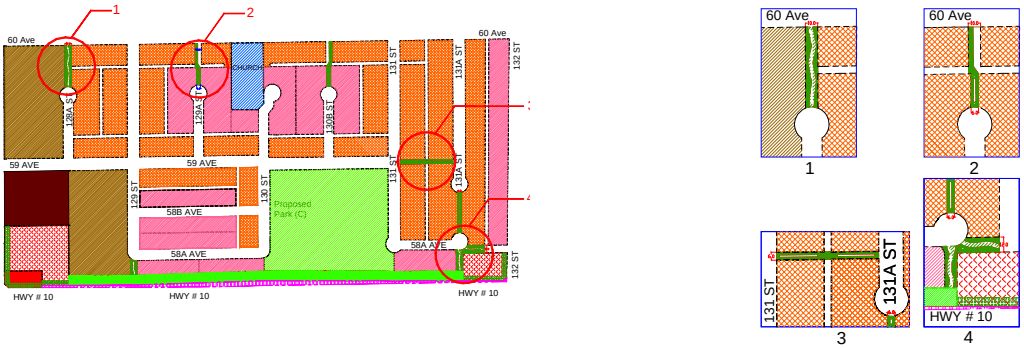
- Road widening along 60 Avenue plus bicycle lanes and one-side parking;

- Closures of 124A Street and 125 Street at Highway 10;

- Pedestrian crossing improvements on 60 Avenue and 128 street, including curb extensions, median islands and pedestrian-activated signals; and

- Traffic circles on 124A Street at 60 Avenue and Boundary Park Drive to address concerns from residents regarding speeding and shortcutting. Also, additional traffic-calming options along 124 Street up to 64 Avenue are being investigated by the City and will be addressed in consultation with the residents.

The pedestrian network is comprised of sidewalks, greenways (the Serpentine Greenway and Highway 10 Buffer/Greenway) and walkways from residential areas to roads and parks. Some of the walkways are proposed in combination with rear lanes. *Figure 7* shows the conceptual layout for walkways. It is recommended that in the case of walkways leading to the Highway 10 buffer/greenway, a minimum 10-metre dedication width should be achieved where possible, but in no case should it be less than 6 metres. Detailed designs should be developed in consultation with the Engineering Department at the time development application review and approval.



Note: Final design should be determined in consultation with the Engineering and Parks, Recreation and Culture Departments.

Figure 7 - Conceptual Plan of Walkways

A key proposal of the plan is to require rear lane access for all new lots fronting 60 Avenue as well as those fronting most new local roads, except short cul-de-sacs and those backing onto Highway 10. This will provide uninterrupted sidewalks along the streets, which will encourage pedestrian use. Also, the requirement for on-street parking pockets and curb extensions on the new through local roads in the central area and specially paved crosswalks at the intersections on 59 Avenue near the community park will contribute to traffic-calming and creating a pedestrian-friendly environment (See *Figure 5*).

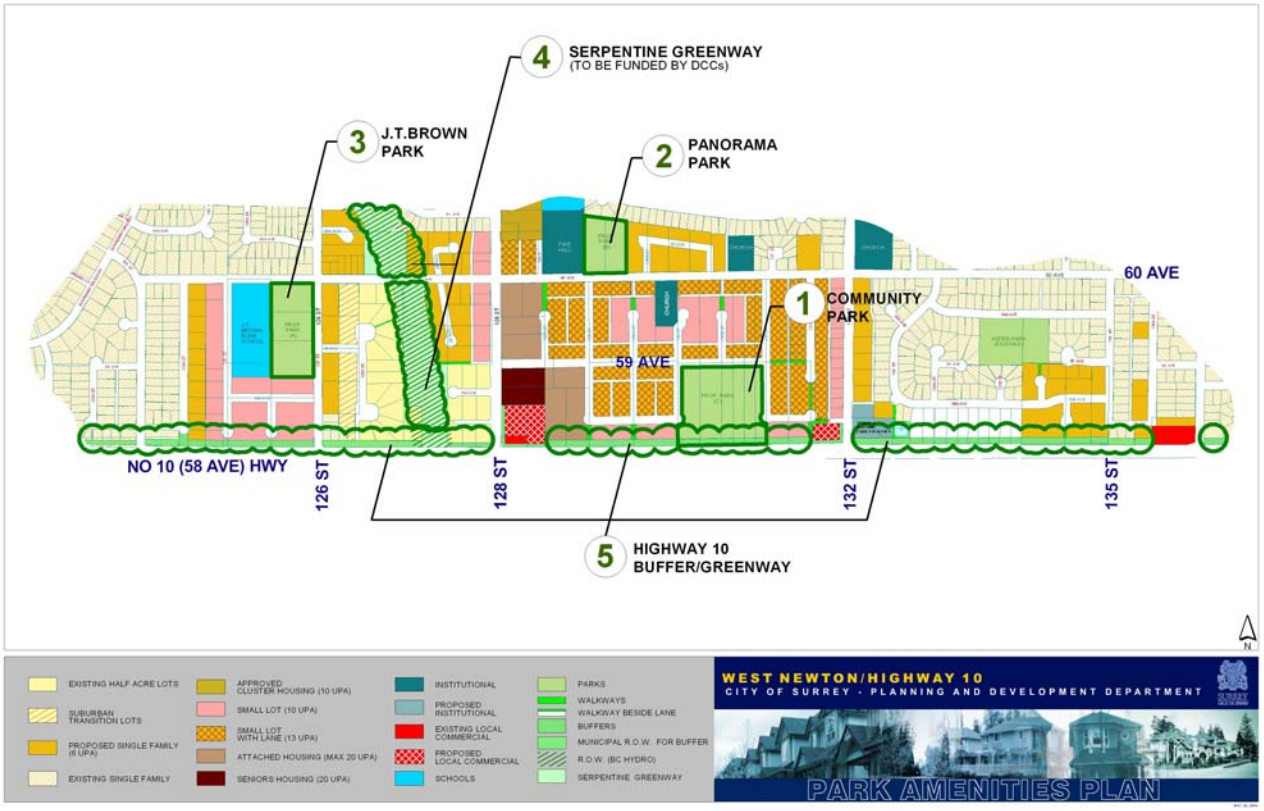


Figure 8 - Park Amenities Plan

Part III: Implementation

1. AMENITY CONTRIBUTIONS

To address the amenity needs associated with the new growth anticipated in the West Newton/Highway 10 Plan area, all new development will be required to make monetary contributions towards the provision of new police and fire protection services, library materials and the development of park amenities.

The monetary contributions will be collected at the time of rezoning or subdivision approvals or building permit issuance, whichever occurs first. The required contributions towards police, fire and library materials will offset the capital costs of providing these services for the new development and are applied on a standardized basis in all Neighbourhood Concept Plan areas in the City. The contributions towards the development of park amenities are based on an estimate of the capital costs for these improvements for this particular NCP area. In the case of residential developments, the total capital cost is divided by the number of anticipated dwelling units to arrive at the contribution amount. In the case of non-residential development, the contributions are collected on the basis of site area. Commercial land uses are exempted from contributing towards park amenities and library materials because commercial uses will have minimal impact on these services, as they do not directly require such services.

1.1 Park Amenity

The estimated cost of developing park and related amenities in West Newton/Highway 10 area is $1,041,352 (2004 dollars). This amount includes development of a soccer field in the community park, the development of Panorama Park, tree management, landscaping, fencing and trails in the J. T. Brown Park and tree management, drainage, landscaping and pathway construction in the Highway 10 buffer/greenway corridor (See *Figure 8* for locations of the proposed park amenities). A summary of the estimated costs and a conceptual layout of the community park are included, respectively, in *Appendix III* and *Appendix IV*. The Serpentine Greenway will be developed using the revenue generated by Development Cost Charges.

Based on 950 new dwelling units anticipated in the area, a park amenity contribution of $1,096.16 is required from each new unit or lot. A table showing the Summary of Amenity Contributions & Anticipated Revenue is provided at the end of this Part.

1.2 Library Materials

A study of library requirements in Surrey's new neighbourhoods has established that a contribution of $125.46 (2004 dollars) per dwelling unit (non-residential development is exempt) is necessary to cover the capital costs for library materials and services, which is proportionate to population growth. Consequently, a total of approximately $119,187 will be collected from new residential development in this Plan area towards materials such as books, computers and CDs.

1.3 Fire and Police Protection

Future development in this area will generate the need to upgrade existing fire and police protection facilities. A study of fire protection requirements in Surrey's new areas has established that a contribution of $240.89 per dwelling unit and $963.58 per acre for non-residential development (both in 2004 dollars) will be required to cover the capital costs for fire protection. Similarly, a contribution of $55.77 per dwelling unit and $223.02 per acre for non-residential development will be required to cover the capital costs for police protection services. This will result in a total capital contribution of approximately $231,736.24 towards fire protection and $53,650.56 towards police protection from development in the Plan area.

1.4 Summary of Amenity Contributions & Anticipated Revenue

A summary of the applicable amenity contributions (per dwelling unit/lot or per acre) and the estimated revenue the City can expect to receive from the West Newton/Highway 10 area at build-out is outlined in the following table.

West Newton/Highway 10 Neighbourhood Concept Plan
Amenity Contributions

	Residential Contribution Per Unit/Lot (Based on 950 New Dwelling Units)	*Non-residential Contribution Per Acre (Based on 3 Acres)*	*Anticipated Revenue at Build-out*
Police Protection	$55.77	$223.02	$53,650.56
Fire Protection	$240.89	$963.58	$231,736.24
Park and Highway 10 Buffer Development	$1,096.16	n/a	$1,041,352.00
Library Materials	$125.46	n/a	$119,187.00
Total:	$1,518.28 per new unit/lot	$1,186.60 per acre	$1,445,925.80

The estimated costs of the various amenities are distributed evenly to each dwelling unit in the area based on the anticipated number of dwelling units. Therefore, if a land use designation on a site is amended in the Land Use Plan such that the number of dwelling units decreases, for example from Attached Housing to Small Lot Residential, the proponent will be expected to "top up" the amenity fees for that development based on the original housing density in the Land Use Plan. This will ensure that there is no shortfall in the funding for the proposed amenities.

2. AMENDMENTS

2.1 Official Community Plan

Where amendments to the Official Community Plan are required to implement this Plan (e.g., redesignation from Suburban to Multiple Residential), they should occur on a site-by-site basis in conjunction with the related development application review process to ensure that the redesignated area conforms to the actual site.

2.2 Neighbourhood Concept Plan

All proposed minor and major amendments to the West Newton/Highway 10 Neighbourhood Concept Plan shall be undertaken in accordance with the policy to amend secondary plans contained in Part 5, Division A of the Official Community Plan.

2.3 Zoning By-law

An amendment to the Zoning By-law is required to implement the amenity contribution component of this Plan. Further, to implement the land use plan specific sites proposed for development/redevelopment will require rezoning in accordance with the established rezoning process.

3. DEVELOPMENT PERMIT AREA GUIDELINES

All commercial and multiple residential developments will be reviewed in accordance with the Development Permit Guidelines of the Official Community Plan.

4. SERVICING, PHASING AND FINANCING

Urban Systems was retained by the Engineering Department to prepare the West Newton/Highway 10 NCP Engineering Service Plan, which is attached. It includes the following parts:

1. Introduction

   Reviews the Land Use Plan and its features that affect the servicing plans.

2. Infrastructure and Servicing

   This is further subdivided into four sections:

   - Transportation
   - Drainage
   - Sanitary
   - Water

   Each section reviews the existing conditions including any historical reports, future conditions and options, and illustrates servicing concepts to support the Land Use Plan.

3. Development Phasing

   Discusses a phasing plan based on the availability of and improvements needed to existing services.

4. Infrastructure Financing and Funding

   Identifies the financing and funding arrangements to implement the proposed servicing infrastructure.

Further details on the servicing, phasing and financing aspects of the West Newton/Highway 10 Neighbourhood Concept Plan are included as Part IV.

Part IV: Servicing Plan

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August 4, 2004 File: 1072.0099.01

City of Surrey
14245 - 56th Avenue
SURREY, BC, V3X 3A2

Attention: Vincent Lalonde, P.Eng.

Dear Sirs:

RE: JULY 21, 2004 FINAL ENGINEERING SERVICING PLAN - WEST NEWTON/ HIGHWAY 10 NEIGHBOURHOOD CONCEPT PLAN

We are pleased to provide the City of Surrey with one camera ready copy of the July 21st - Final Engineering Servicing Plan for the West Newton/ Highway 10 Neighbourhood Concept Plan. We have included the maps at both the 8.5" X 11" and 11" X 17" format for your use. Also include is a PDF version of the report for your use and distribution as required. This revised version addresses all the changes we have received from both the engineering and planning departments. If you require further paper copies please let us know. If you require any additional background materials please contact us at 273-8700. It has been a pleasure working with the City on this project.

Thank you for your assistance.

Yours truly,

URBAN SYSTEMS LTD.

Fraser Smith, P.Eng., MBA
/fs

Cc KK Li, Engineering, City of Surrey
Jamie Boan, Engineering, City of Surrey
Bhargav Parghi, Planning, City of Surrey
Angus English, Engineering, City of Surrey

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CITY OF SURREY

WEST NEWTON/HIGHWAY 10 NEIGHBOURHOOD CONCEPT PLAN ENGINEERING SERVICING PLAN

SURREY
CITY OF PARKS

July 21 2004

1072.0099.01 / July 21, 2004

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Richmond, BC, V6V 3A1
Phone: 604-273-8700
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City of Surrey

West Newton/ Highway 10

Neighbourhood Concept Plan Engineering Servicing Plan

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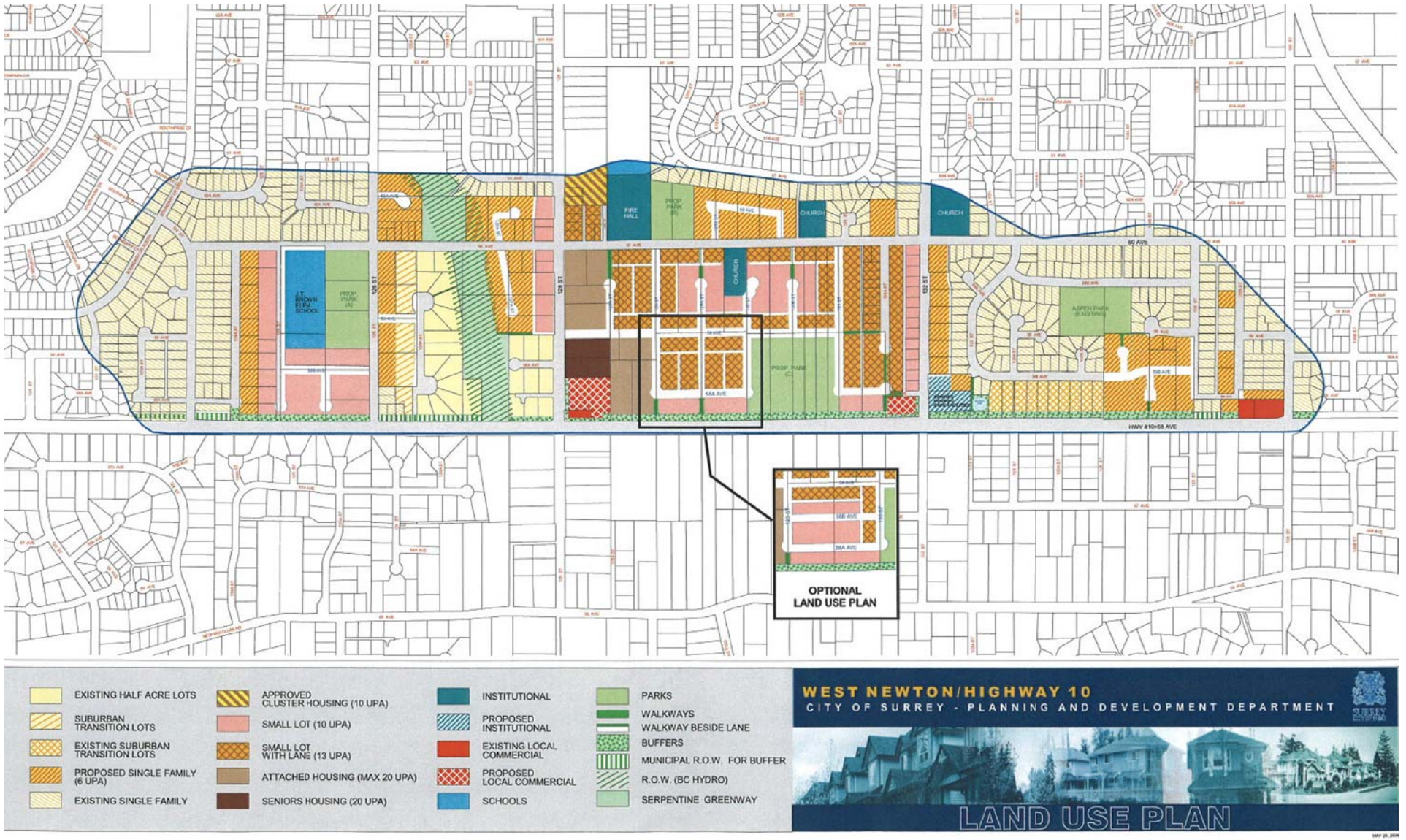
1.0 INTRODUCTION

The City of Surrey is developing a neighbourhood concept plan (NCP) for the West Newton / Highway #10 area of Surrey. The City undertook an extensive public consultation in 2004 to help develop an urban land use plan for an area of Newton currently designated suburban. As part of the planning process a series of planning goals and objectives were identified as well as opportunities and constraints in the concept plan area. These issues were considered and addressed during the Stage 1 NCP process.

In January 2004, the City Council approved the Stage 1 component of the NCP for the West Newton / Highway #10 area. Council instructed staff to complete the Stage 2 component of the NCP on the basis of the Stage 1 land use concept plan shown in **Figure 1.0.** Planning staff were instructed to resolve the outstanding land use issues identified in the West Newton / Highway #10 NCP-Stage 1 Council Report and develop a community amenities program for the area.

This report will address the required engineering servicing strategy and comprehensive engineering financial plan requested by Council. As part of this report the logical phasing of the development of the NCP, from an engineering perspective, will also be completed.



PROJECT No: 1072.0099.01

DATE: JUNE 21, 2004

FIGURE 1.0

1.1 Stage 1 Land Use Concept Plan

The West Newton / Highway #10 concept plan area and larger study area are shown in **Figure 1.0**. The concept plan area is bound by 136th street, 124th Street, approximately 61th Avenue and Highway #10. For the engineering analysis this catchment was expanded to ensure that the complete servicing / modelling catchments were included. The land use plan was also expanded to ensure compatibility and coordination with the surrounding areas. These areas were included in the public consultation.

1.1.1 Proposed Land Use Plan

The proposed land use concept is shown in **Figure 1.0**. Single-family residential land uses are the most dominant land use in the plan, but are included with a variety of densities ranging from Suburban transition lots (along the west side of 126A Street) to conventional single-family lots (6 units per acre) and small lots of various densities (10 to 13 units per acre, with or without lane access). New residential subdivisions will be designed to blend into the surrounding neighbourhood pattern.

The land use plan also features a variety of multi-family residential uses, including townhouses (20 units per acre), seniors housing (20 units per acre) and sites designated for seniors' townhouses and a care facility or nursing home. In addition, the plan proposes two local commercial nodes, and three neighbourhood parks to serve this community.

It is estimated that the proposed land use concept plan will generate an additional 950 residential dwelling units and will accommodate an additional population of approximately 2,880 people, bringing the total population of this community at full build-out to between 4,200 and 4,500 people. A summary of the proposed land uses, including total number of dwelling units and projected population, is documented in **Appendix A**.

2.0 INFRASTRUCTURE SERVICING

2.1 Transportation

2.1.1 Existing Conditions

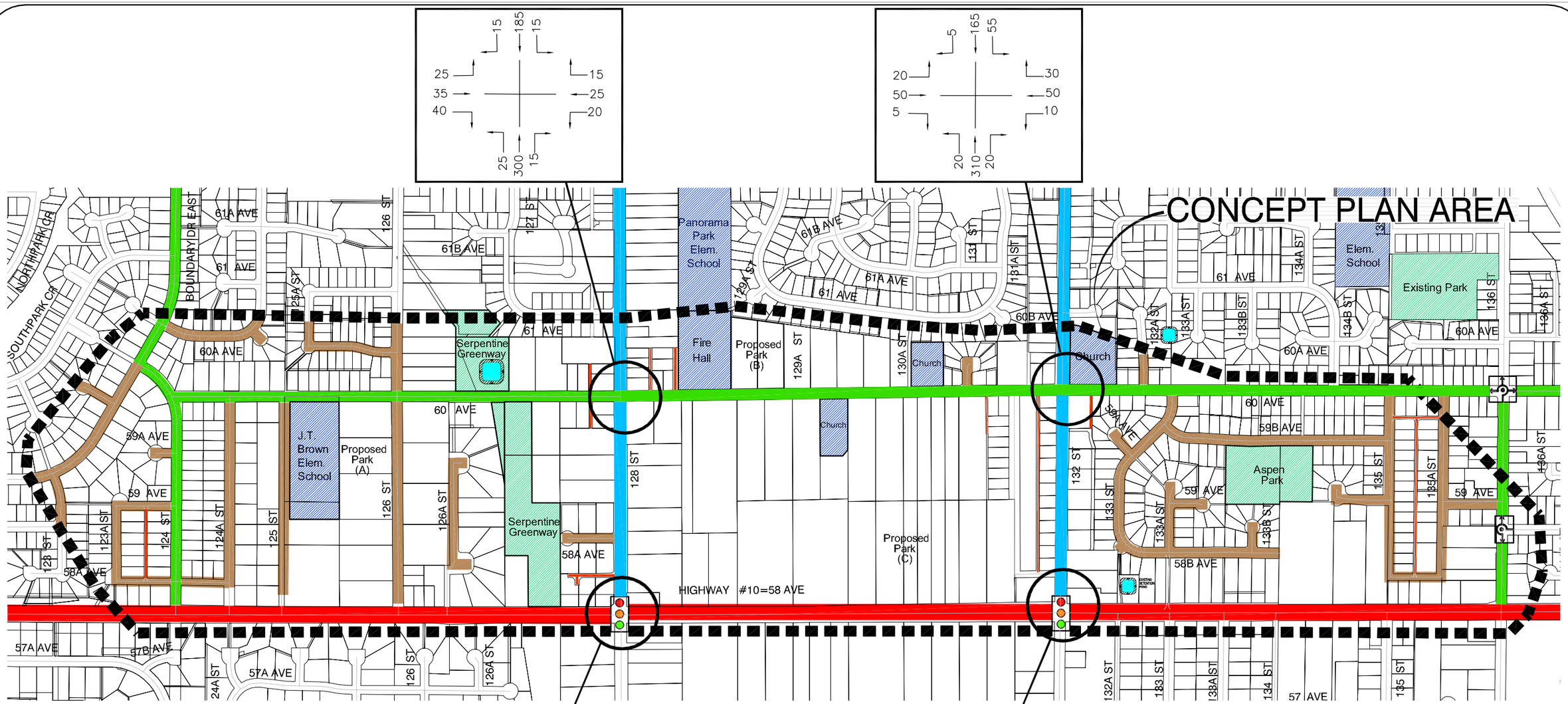
The West Newton/Highway #10 neighbourhood study area is bounded by Highway #10 to the south, 124th Street to the west, 136th Street to the east and extends just north of 60th Avenue.

Existing land uses within the study area are primarily single-family residential lots and undeveloped lots, with some community facilities such as churches, schools and parks.

The existing roadway network in the area is illustrated on **Figure 2.1.1.** 128th Street and 132nd Street are both north-south arterial roads, with two lanes each. 60th Avenue and 124th Street are major collector roads, also with two lanes each. Highway #10 is designated as a provincial highway and for the most part is a two-lane facility through the study area. There are also a number of local streets within the study area which provide access to residential properties.

Available traffic data was provided by the City for use in this study. Intersection volumes from 1998 and 1999 were used in conjunction with 2003 corridor volumes to estimate existing traffic volumes, as well as provide a basis for forecasting future traffic volumes. Estimated existing traffic volumes are shown on **Figure 2.1.1**.

Intersections within the area are primarily two-way stop-controlled. The only signalized intersections are the 128th Street and 132nd Street intersections on Highway #10.



Legend:

- Concept Plan Area
- Provincial Highway
- Arterial
- Major Collector
- Local Road
- Laneway
- Existing Traffic Signals
- Existing Traffic Circles
- PM → Peak Hour Volume

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WEST NEWTON/HIGHWAY #10 NEIGHBOURHOOD CONCEPT PLAN TRANSPORTATION

EXISTING ROAD NETWORK & EXISTING PM PEAK HOUR VOLUMES

PROJECT No: 1072.0099.01

DATE: JUNE, 2004

FIGURE 2.1.1

2.1.2 Future Conditions

This section describes future planned and proposed traffic and transportation conditions within the study area.

Current Plans

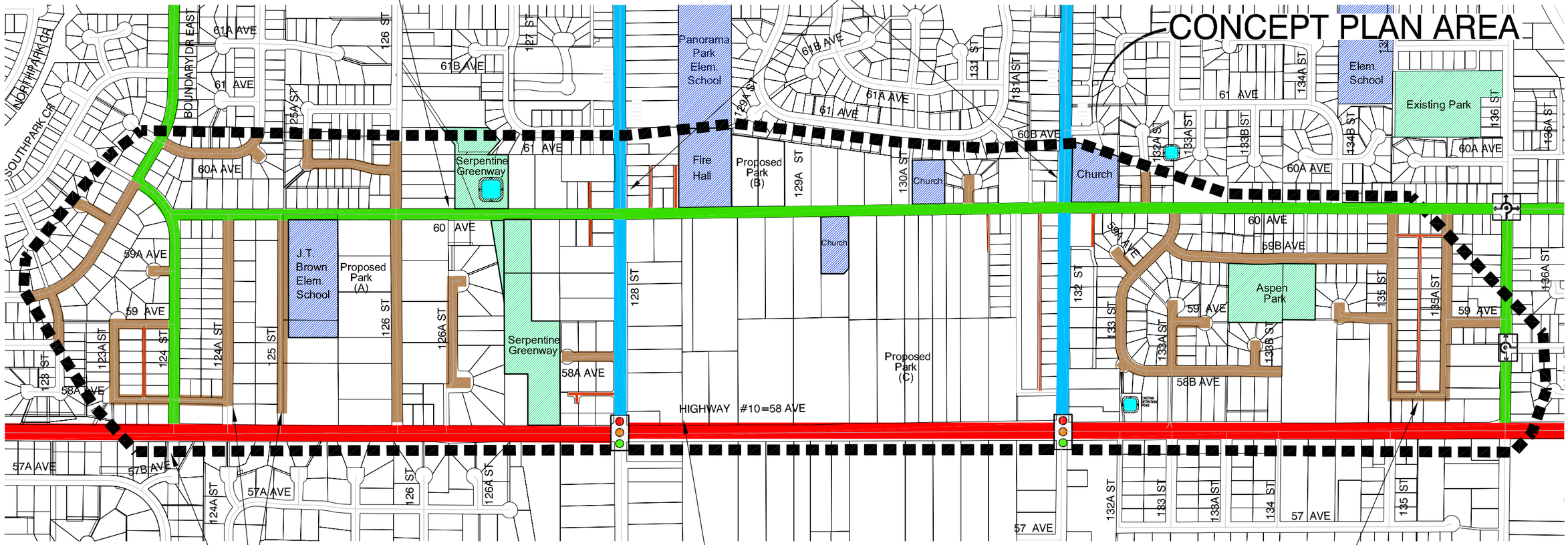
At the outset of this study, the City provided background materials describing current City and MoT plans which will affect the road network in the study area. These plans are illustrated in **Figure 2.1.2** and are described below:

- 128th Street and 132nd Street within the area are currently classified as arterial roads. Consistent with this road classification, the City has indicated that they intend to eventually widen 128th Street and 132nd Street to four-lane cross-sections, with the provision of auxiliary lanes as needed to provide additional turning capacity at intersections. The City is therefore protecting the road corridor to allow for this ultimate condition.
- 60th Avenue is currently classified as a major collector road. Consistent with this classification, the City intends to eventually widen 60th Avenue in order to incorporate bicycle lanes and on-street parking along one side, maintaining two travel lanes plus turn lanes as needed at intersections.
- Within the study area, other minor improvements are planned, including the widening of 135th Street and 58A Avenue to the City's local road standard.
- The Ministry of Transportation plans to widen Highway #10 through the study area. This project will involve widening the roadway to four through lanes (two in each direction), plus additional turn lanes at signalized and unsignalized intersections. The Ministry also wishes to minimize access to and from Highway #10 in order to maximize safety and roadway capacity on Highway #10, and consequently plans to close 124A Street and 125th Street at Highway #10 and create cul-de-sacs on these roads. Also as part of this project, access to 124th Street from Hwy #10 will be limited to right-in/left-in/right-out only and access to 124th Street from the highway will be available via a designated left-turn lane on the highway.

Widen 60 Avenue to 2 lanes plus bicycle lanes and one-side parking.

Preserve for ulitimate widening 128 Street and 132 Street to 4 lanes

CONCEPT PLAN AREA



Proposed Right-in/Left-in and Right-out Access only

Proposed Cul-de-Sac on 124A Street and 125 Street at Highway 10

Proposed 4-laning of Highway 10

Proposed widening of 135 Street and 58A Avenue to create standard road width

Legend:

- Concept Plan Area
- Provincial Highway
- Arterial
- Major Collector
- Local Road
- Laneway
- Existing Traffic Signals
- Existing Traffic Circles

0 500 Meters

N

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WEST NEWTON/HIGHWAY #10 NEIGHBOURHOOD CONCEPT PLAN TRANSPORTATION

PLANNED IMPROVEMENTS

PROJECT No: 1072.0099.01

DATE: JUNE, 2004

FIGURE 2.1.2

Site-Generated Traffic

The proposed land use plan for the West Newton/Highway #10 neighbourhood was illustrated in **Figure 1.0**. As shown, the plan includes a mix of predominantly residential uses including single-family detached housing on urban lots, single-family housing on rural lots and low-density multi-family residential development. In addition to this, the proposed land use plan for the area also includes three new park sites and two commercial centres proposed on Highway #10 at 128th Street and 132nd Street.

Site-generated traffic — traffic which would be generated by new development within the study area — was estimated using trip generation rates published by the Institute of Transportation Engineers in the *Trip Generation Manual, Sixth Edition.* **Table 2.1.1** provides a summary of forecast site-generated traffic for each of the proposed new land uses within the study area.

Table 2.1.1
Forecast Traffic Demands for Proposed Land Use Plan

Land Use	Quantity	Site-Generated Traffic			
		AM Peak Hour		PM Peak Hour	
		In	Out	In	Out
Single family and clustered housing, various sized lots	2460 pop.	165	355	455	235
Multi-family or attached housing	400 pop.	15	65	65	30
Local Commercial	2 acres	245	185	100	130
Park Space	16 acres	15	15	15	15
Care Facility	40 new beds	5	5	5	5
Total Site-Generated Traffic		445	625	640	415

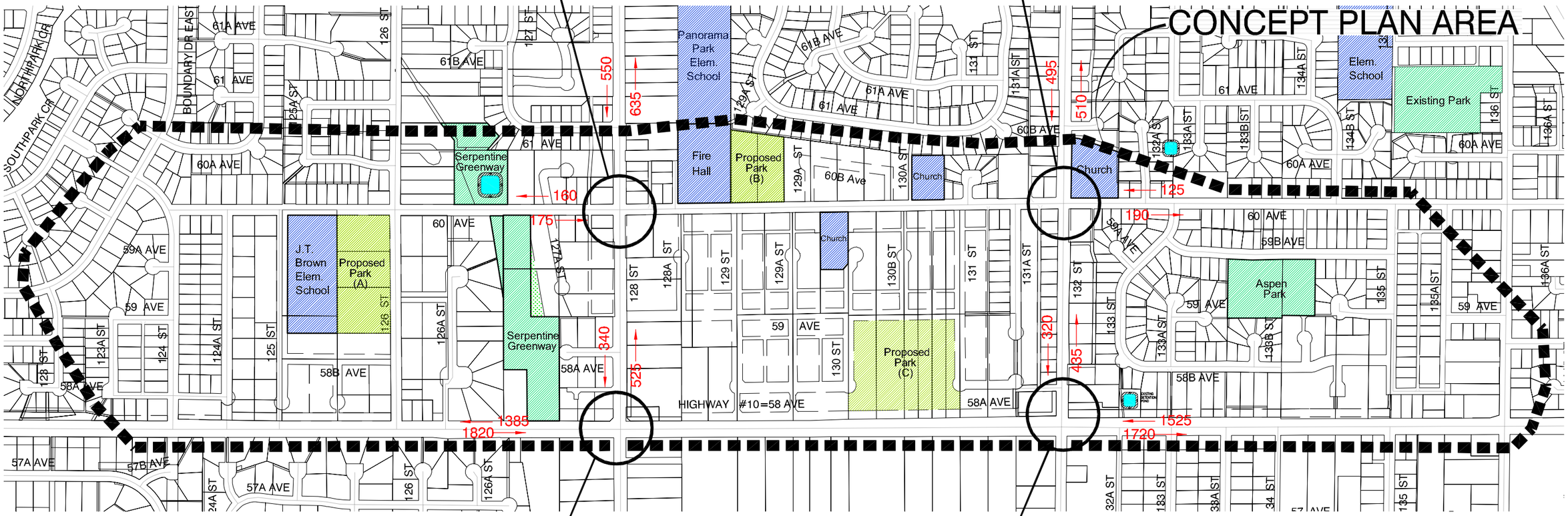
As summarized in **Table 2.1.1**, the proposed land use plan for the West Newton/Highway #10 neighbourhood is forecast to create approximately 1070 and 1055 additional vehicle trips during the AM and PM peak hours, respectively.

In order to determine future road network needs, the site-generated traffic forecasts were added to the projected background traffic volumes for the study area to produce forecasts of total future traffic volumes within the study area. Background traffic is traffic generated by existing land uses within the study area, as well as traffic travelling through the study area.

Background traffic (for 2021) in the neighbourhood was forecast based on estimated growth rates for key corridors within the study area. Based on information provided by the City, an overall growth estimate of 10% was used for traffic along 60th Avenue, and an overall growth estimate of 25% was used for traffic along 128th Street and 132nd Street.

Figure 2.1.3 illustrates total forecast traffic volumes for 2021 within the study area. Traffic was assigned to the road network based on trip distribution information from the Surrey sub-area transportation model. Although the sub-area model information is for the AM peak hour only, a review of local travel patterns indicated that AM and PM peak hour distribution patterns are similar therefore the same trip distribution pattern was applied for the PM peak hour.

CONCEPT PLAN AREA



Legend:

- Concept Plan Area
- PM → Peak Hour Volume

0 500 Meters

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Engineering • Planning • Landscape Architecture • Local Government

West Newton/Highway #10 Neighbourhood Concept Plan Transportation

Total Forecast PM Peak Hour Traffic Volumes (2021)

PROJECT No: 1072.0099.01

DATE: June, 2004

Figure 2.1.3

2.1.3 Future Transportation Network

This section describes the recommended roadway network improvements within the study area, including traffic calming measures and pedestrian crossings. All recommended improvements are illustrated on **Figure 2.1.4**.

Widen 60 Avenue to 2 lanes plus bicycle lanes and one-side parking.

CONCEPT PLAN AREA

Proposed Right-in/Left-in and Right-out Access only

Proposed Cul-de-Sac on 124A Street and 125 Street at Highway 10

Proposed 4-laning of Highway 10

Proposed widening of 135 Street and 58A Avenue to create standard road width

LEGEND:

- Concept Plan Area
- Provincial Highway
- Arterial
- Major Collector
- Local Road
- Proposed Local Road
- Laneway
- Proposed Laneway
- Existing Traffic Signals
- Existing Traffic Circles
- Proposed Traffic Circles
- Proposed Traffic Signals
- Pedestrian Crossing Improvements
- Buffer Zone
- On-street Parking Pockets
- Curb Extensions
- Curb Extensions with Special Paving at Crosswalks (Special paving such as pigmented asphalt/concrete)

0 500 Meters

N

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Engineering • Planning • Landscape Architecture • Local Government

WEST NEWTON/HIGHWAY #10 NEIGHBOURHOOD CONCEPT PLAN FUTURE TRANSPORTATION NETWORK (2021)

PROJECT No: 1072.0099.01

DATE: JUNE, 2004

FIGURE 2.1.4

Traffic Analysis

Traffic operations analysis of key intersections within the study area was conducted using Synchro. Operations at each intersection were analysed for both the un-improved and future recommended condition. The **Table 2.1.2** summarizes the level of service and delay results for the 60th Avenue at 128th Street and 132nd Street intersections.

Table 2.1.2
Levels of Service and Delay Results for
60th Avenue at 128th Street and 132nd Street

Intersection	Traffic Control	Intersection		Notes
		Level of Service	Delay	
Future Condition (2021) – No Improvements				
60 Avenue at 128 Street	Two-Way Stop	F	211 sec.	Assumes existing configurations
60 Avenue at 132 Street	Two-Way Stop	D	49 sec.	Assumes existing configurations
Future Condition (2021) – With Recommended Optional Improvements				
60 Avenue at 128 Street	Signalized	A	10 sec.	Assumes left turn lanes for north and southbound traffic and 2 lanes on 128 Street
60 Avenue at 132 Street	Signalized	A	6 sec.	Assumes left turn lanes for north and southbound traffic and 2 lanes on 132 Street
60 Avenue at 128 Street	Single-lane roundabout	v/c ratios: EB = 0.24 WB = 0.24 NB = 0.60 SB = 0.53		Assumes 2 lanes on 128 Street
60 Avenue at 132 Street	Single-lane roundabout	v/c ratios: EB = 0.21 WB = 0.17 NB = 0.50 SB = 0.47		Assumes 2 lanes on 132 Street

The results shown in **Table 2.1.2** indicate that both intersections will be functioning at a deteriorated or unacceptable level of service by 2021 without any improvements. Converting the existing two-way stop control to four-way stop control will not address this issue — levels of service during the afternoon peak hour will remain unacceptable. Options for providing acceptable levels of service include roundabouts and traffic signals. In all cases, 128 Street and 132 Street will not need to be widened to four lanes — both can remain as two-lane roads (with turn lanes at intersections as required) through to 2021.

Operations at the intersections of 128th Street and 132nd Street with Highway #10 will also continue to function at acceptable levels of service considering the improvements that are suggested by the Ministry's plans to widen Highway #10. By 2021, the addition of auxiliary lanes on the north and south approaches of these intersections may be required and should be incorporated into the overall project.

Roadway Network

The future road network within the West Newton/Highway #10 neighbourhood area will include the following planned improvements (as described in Section 2.1.2), plus additional improvements recommended based on the results of the traffic analysis:

- 128th Street and 132nd Street — which are arterial roads — can remain two lanes to 2021, however, northbound and southbound left-turn lanes will be developed at the intersections with 60th Avenue.
- 60th Avenue — which is a major collector road — will be upgraded to provide two lanes plus bicycle lanes (one through lane and one bicycle lane in each direction), plus on-street parking along one side of the road.
- Highway #10 will be widened to four lanes through the study area, with turn lanes at signalized and unsignalized intersections. Direct access to Highway #10 from individual properties will be restricted to right turns only. In conjunction, 124A Street and 125 Street will be made cul-de-sacs and 124 Street limited to right-in/left-in/right-out only in order to maximize safety and roadway capacity on the highway.
- New internal roadways in the neighbourhood will be constructed to the City's local road standard. In addition, as shown in Figure 2.1.4, on-street parking pockets, curb extensions and curb extensions with special paving requirements will be required for the control area of the NCP between 128th Street and 132nd Street. Lanes will provide access to properties located along arterial roads, as these properties would not be accessed from the arterial roads.
- The 60th Avenue/128th Street and 60th Avenue/132nd Street intersections may be signalized or controlled with roundabouts. As noted, northbound and southbound left-turn lanes will be provided on 128th Street and 132nd Street at 60th Avenue.

Commercial Access

Access will be restricted to the two commercial centres on Highway #10 — one at 128th Street and a smaller one at 132nd Street, as shown on the overall land use concept plan in **Figure 1.0**. Both intersections on Highway #10 adjacent the commercial centres are signalized. What this means is that desirably, access is restricted within 100 m of the intersection to right turns into and out of commercial driveways — no left turns are permitted. This is necessary to avoid safety problems which could otherwise arise as a result of left-turning traffic entering and exiting the commercial centres interfering with and being obstructed by traffic queued at the adjacent signalized intersection.

For the commercial centre at 128th Street, accesses on 128th Street could be restricted to right-in/right-out movements. The City should consider permitting left turns to and from an access located at the very north end of this commercial site, as the distance from the signalized intersection at Highway #10 is over 90 m. Any access on Highway #10 should be restricted to right turn into the commercial site only.

For the commercial centre at 132nd Street, the access on 132nd Street should be restricted to right-in/right-out movements. In addition, this access should be located as far from Highway #10 as possible, so that vehicles turning onto 132nd Street are able to manoeuvre to the southbound left turn lane at the signalized intersection. The north end of the commercial site is approximately only 50 m north of Highway #10, which does not provide sufficient spacing from the Highway #10 intersection. Consequently it would not be desirable from a traffic operations and safety perspective to provide a left turn access to the commercial site from 132nd Street. Access on Highway #10 should be restricted to right-in/right-out movements.

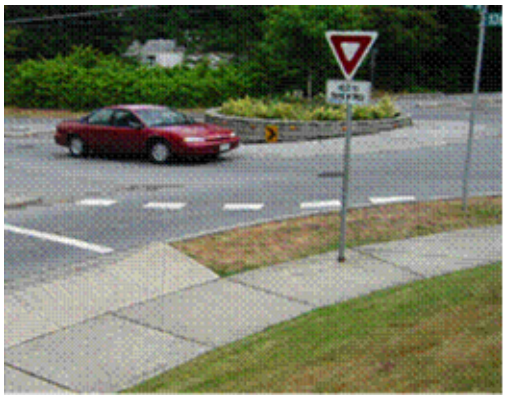
Traffic Circles

The need for traffic calming on 124th Street was identified by several residents in the study area and confirmed by City staff as a future direction for the neighbourhood's planned network. Reported issues include speeding and short-cutting, as well as pedestrian and motorist safety.

To address speeding and intersection safety issues on 124th Street, two traffic circles are being proposed at the 124th Street/60th Avenue and 124th Street/Boundary Drive intersections, as shown in **Figure 2.1.4**. It should be noted however that these circles are subject to consideration by Coast Mountain Bus Company to ensure that they are compatible with any future plans for transit service in the area. If services would require full-sized transit vehicles to turn left at either of these intersections, traffic circles would no longer be suitable and alternative measures such as raised intersections or curb extensions would need to be considered.

A traffic circle is a raised island located in the centre of an intersection. Vehicles are required to travel around the traffic circle in a counter-clockwise direction. The proposed traffic circles would be similar to the existing intersection controls on 136th Street at 58A Avenue and 60th Avenue as shown in **Figure 2.1.5.**

Figure 2.1.5
Existing Roundabouts in the West Newton/Highway #10 Neighbourhood



Existing Traffic Circle at 60th Avenue and 136th Street

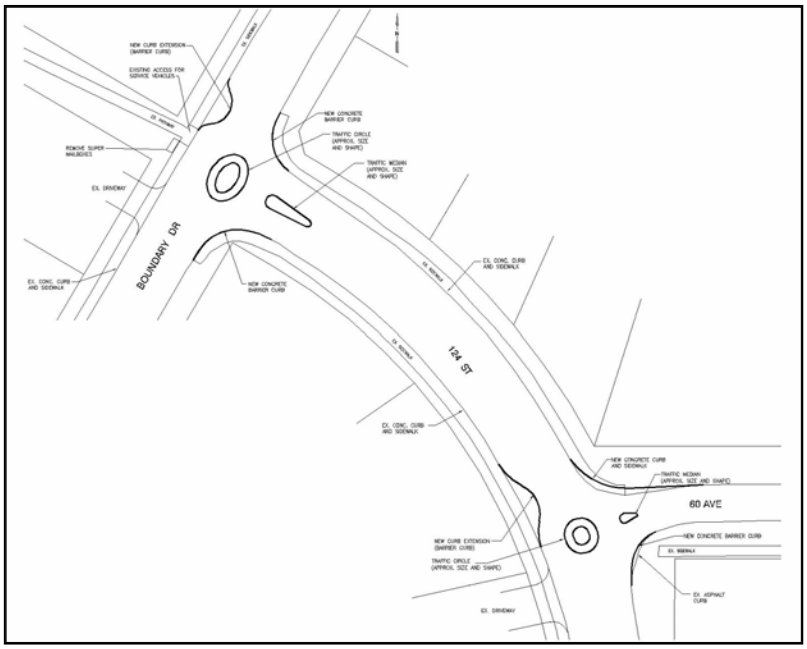
Existing Traffic Circle at 58A Avenue and 136th Street

Traffic circles at these two intersections would provide several benefits:

- *Safety.* Traffic circles in other locations throughout the Canada and the U.S. have been reported to reduce intersection crashes by 50% to 80%. In particular, traffic circles reduce the numbers of serious crashes — injuries and fatalities.
- *Speed.* Traffic circles discourage excessive speeds. Experience elsewhere indicates that mid-block speeds can be reduced to 50 km/h or less.
- *Volume.* Used in combination, traffic circles can discourage short-cutting traffic. In other locations, traffic circles have reduced traffic volumes by up to 15%.
- *Aesthetics.* Traffic circles provide an opportunity for attractive landscaping to enhance the appearance of the street and the neighbourhood.

A conceptual layout of these traffic circles is illustrated in **Figure 2.1.6**. It should be noted that traffic circles at these two intersections would be designed to fit the geometry of each intersection, alternative measures such as raised intersections or curb extensions would need to be considered for full size transit vehicles movement. Splitter islands may be required to prevent improper left turns in a clockwise direction.

Figure 2.1.6
Conceptual Layout of Proposed Traffic Circles



Following implementation of the traffic circles described above, should speeding issues persist on 124th Street or 60th Avenue, the City may wish to consider the implementation of further traffic calming measures such as speed humps, speed tables or speed cushions, according to the City's existing traffic calming policy and process.

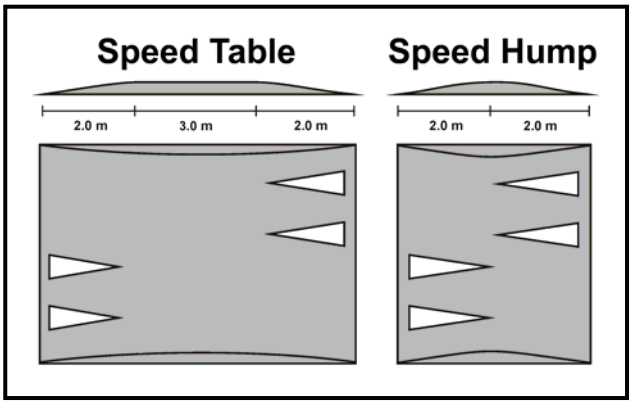
The current policy states that if two of the following three criteria are met or exceeded, traffic calming measures may be implemented as a means of reducing vehicles speeds or short cutting:

- Daily volumes of 1,000 vehicles per day on local roads or 3,000 vehicles per day on collector roads
- 85th percentile speeds at least 10 km/h higher than the posted limit (i.e. greater than 60 km/h in a 50km/h zone or greater than 40 km/h in a 30 km/h zone)
- Through traffic accounting for more than 30% or more than 100 vehicles per hour

If the above criteria continue to be met, effective speed-reducing devices such as those briefly mentioned below may be considered.

- *Speed humps.* Speed humps are one of the most effective ways of reducing neighbourhood vehicle speeds. Speeds humps for local roads are typically 4 metres (13 feet) long and at moderate vehicle speeds, will gently rock a car, whereas at higher speeds, there is more of a jolt. The result is that motorists typically slow to about 35 km/h traveling over a speed hump. Speed humps do not affect on-street parking — motorists can park on top of a speed hump and are also safe for bicycles.

- *Speed tables.* Speed tables are also designed to discourage speeding. They are similar to speed humps, but are longer with a flat section in the middle of the speed table. Speed tables are typically used on higher-volume roads or emergency response routes.



- *Speed cushions* provide the same benefits as speed humps — discouraging speeding and short-cutting — but create only minimal delays for emergency vehicles. Speed cushions are rectangular raised sections of roadway, with gaps between them sized to fit the wheels of a fire truck or bus, but not the wheels of a passenger vehicle.

Pedestrian Crossings

As illustrated in **Figure 2.1.4**, a number of locations on arterial and collector roads within the study area have been identified as appropriate for improved pedestrian crossing treatments. The following crossing treatments should be considered in these locations to improve pedestrian safety and encourage residents to make trips within the neighbourhood on foot rather than in automobiles. Specific treatments and locations should be determined by the City at the time of implementation to coincide with other pedestrian improvement projects or greenway projects underway.

The following discussion describes the types of measures that may be considered to enhance the crossing safety of pedestrians in the West Newton neighbourhood. In general, each of these measures are designed primarily to improve the safety for crossing pedestrians. Although measures such as curb extensions and raised median islands may also have a slight speed reduction effect, generally they should not be considered as a means of discouraging excessive speeds.

- *Curb extensions.* As illustrated in **Figure 2.1.7**, a curb extension involves extending the curb on one or both sides of the roadway, effectively narrowing the width of the road. Curb extensions improve pedestrian safety by increasing pedestrian visibility, reducing the crossing distance and slowing traffic. Curb extensions can be used at intersections and at mid-block locations, and can also be landscaped to enhance their aesthetics.

Figure 2.1.7
Example of a Curb Extension

- *Median islands.* A median island is an alternative to curb extensions. Rather than narrowing the roadway from the outside in, as with a curb extension, a median island narrows the roadway from the inside out, as illustrated in **Figure 2.1.8**. Median islands improve pedestrian safety by increasing pedestrian visibility, reducing the crossing distance, providing a central safety refuge and slowing traffic. Median islands can be used at intersections and at mid-block locations, and can be landscaped.

Figure 2.1.8
Example of a Median Island

- *Pedestrian-activated signals* (**Figure 2.1.9**) are traffic signals which can only be activated by pedestrians, not by motor vehicles. When activated, traffic is stopped by a red light. Pedestrian-activated traffic signals are warranted only in locations with high numbers of pedestrians, and are

best-suited to intersection locations. Other measures — such as curb extensions and median islands —– are better-suited to locations with low and moderate numbers of pedestrians, and mid-block locations.

Figure 2.1.9
Example of Pedestrian Activated Signals

Following implementation of enhanced crossings as noted above, should pedestrian safety issues persist as a result of speeding vehicles, the City may wish to consider the addition of specific speed-reducing traffic calming measures. The implementation of these measures should follow the City's existing traffic calming policy and process as is described in the previous section of this report.

2.2 Drainage

2.2.1 Review of Historical Reports, Existing Drainage Conditions, and Future Servicing Requirements (OCP Land Use Option)

The existing drainage systems servicing the West Newton/Highway #10 area and the future servicing requirements have been previously evaluated under three separate studies:

- West Newton (South) NCP, UMA Engineering Ltd., 1995.
- Eugene Creek Drainage Analysis, UMA Engineering Ltd., 1995.
- Panorama Ridge Drainage and Slope Stability Assessment Study, Stanley Consulting Group Ltd., 1999.

The study area is divided into several drainage subcatchments of which two major subcatchments are contained within Eugene Creek, and Peacock Brook drainage catchments. **Figure 2.2.1** shows drainage subcatchment boundaries and the existing direction of flow for the subcatchments of interest within and surrounding the study area.

The boundary that delineates the two major subcatchments generally runs along 128th Street north of 60th Avenue, and along 127A Street south of 60th Avenue. Portions of the study area west of 128th Street drain in the southerly direction through a 900 mm diameter trunk sewer under Highway #10, along 124th Street, and ultimately to Eugene Creek. The area east of 128th Street contributes runoff to the Peacock Brook drainage system through two separate storm sewers on 128th and 132nd Streets, and the existing storm sewers on New McLellan Road.

The Eugene Creek drainage catchment was analyzed in detail under two studies completed by UMA Engineering: West Newton (South) NCP and Eugene Creek Drainage Analysis. Furthermore, this system was re-evaluated as part of the Panorama Ridge Drainage and Slope Stability Assessment Study, along with the Peacock Brook drainage catchment. The entire Panorama drainage area including Eugene Creek and Peacock Brook watersheds ultimately drains to the Colebrook Pump Station and discharges into Mud Bay.

Eugene Creek Upland Area

Panorama (Peacock Brook) Upland Area

CONCEPT PLAN AREA

Replace 600mmØ storm inlet and pipe section with 900mmØ sewer.

Install flow control structure.

Maintain detention pond in operation.

Replace twin 450mmØ culverts under Hwy #10 with single 750mmØ sewer.

Replace 450mmØ culvert under Highway #10 with 650mmØ storm sewer; Install 600mmØ parallel storm trunk on west side of 128 St. between Highway #10 and 56 Ave.

Replace 450mmØ storm sewer section on 132 Street immediately north of 56 Ave. with 525mmØ sewer (approximate length 45m).

West Newton (South) N.C.P. Area

Panorama Park Elem. School

Fire Hall

Proposed Park (B)

Proposed Park (A)

Proposed Park (C)

J.T. Brown Elem. School

Existing Park

Aspen Park

Serpentine Greenway

Church

HIGHWAY #10=58 AVE

900Ø

825Ø

750Ø

BOUNDARY DR NORTH

BOUNDARY DR EAST

NORTHPARK CR

SOUTHPARK CR

LEGEND:

- Concept Plan Area
- Sub-Catchment Boundary
- Existing Catchment Boundary
- Area currently Serviced
- Area not Serviced by Existing Storm
- Existing Catchment Flow Direction
- 375 PV — Existing Storm Sewers and Ditch
- Regional Catchment Boundary
- Proposed Storm Sewer
- Proposed Storm Trunk
- 900Ø — Preliminary Future Trunk Size

0 500 Meters

N

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WEST NEWTON/HIGHWAY #10 NEIGHBOURHOOD CONCEPT PLAN

STORM

PROJECT No.: 1072.0099.01

DATE: JUNE, 2004

FIGURE 2.2.1

Acad 16.0 U:\PROJECTS\1072\0099\01\Dwgs\Current\REPORT-JUNE-04\Report-Storm.dwg (Layout1) Jul 05, 2004 - 9:42am

Eugene Creek Drainage Catchment

A drainage subcatchment, referred to as Catchment Area 3 in West Newton (South) NCP, is located immediately north of the concept plan area (see **Figure 2.2.1**) and represents the most upstream portion of the Eugene Creek watershed. This subcatchment drains in the southerly direction through the subject area along the 60th Avenue/126th Street/Highway #10 drainage route. Runoff from other subcatchments is collected by a combination of storm sewers and open ditches on 124th Street, 124A Street, 125th Street, 126th Street and 126A Street and intercepted by a drainage ditch on the north side of Highway #10. At the 124th Street and Highway #10 intersection, collected runoff from the ditch enters the existing 900 mm diameter storm trunk sewer.

A drainage strategy involving a detention pond and a 900 mm diameter diversion trunk sewer along New McLellan Road, 121A Street, and Hillside Road was adopted to mitigate impacts of upstream urban development to Eugene Creek ravine. The extended stormwater detention pond (Project ID 6451) within the BC Hydro right-of-way north of 60th Avenue is listed in the City of Surrey 10-Year Servicing Plan, and constructed in 2002. The purpose of this pond is to attenuate peak runoff rates emerging from the Concept Area 3. As well, other drainage works in the Eugene Creek upland area included the design and construction of storm sewers on 60th Avenue and 126th Street, and culverts replacement along Highway #10 north ditch to improve conveyance system capacity and performance.

It is our understanding that the diversion trunk storm sewer option along New McLillan Road, 121A Street, and Hillside Road was abandoned and replaced with the proposal to construct a diversion sewer or open channel from the downstream end of the existing Eugene Creek diversion storm trunk sewer to outfall at Mud Bay. We also understand that the City of Surrey is currently negotiating properties for the construction of this structure.

Peacock Brook Drainage Catchment

With the exception of a few minor subcatchments on the east and north side of the concept plan area, runoff from areas east of BC Hydro right-of-way (south of 60th Avenue) and 128th Street (north of 60th Avenue) flows in the southerly direction and discharges into Peacock Brook. A portion of the study area between BC Hydro right-of-way and 132nd Street drains south to the 132nd Street and Highway #10 intersection. The storm sewers in this areas services the 4.5 ha large subdivision located north of Highway #10, around 133rd Street and 133A Street. One of the objectives of the drainage system review is to identify if this pond is still required.

Drainage system improvements proposed in the "Panorama Ridge Drainage and Slope Stability Assessment" report included twinning of the existing storm trunk sewer along 128th Street between Highway #10 and 56th

Avenue, and construction of diversion trunk sewers between 56th Avenue and 54A Avenue to divert 128th Street and 132nd Street storm trunk sewer flows away from Peacock Brook ravine. Although slightly changed from the originally proposed alignments and sizes, the Peacock Creek storm diversion system was constructed in 2002. The required storm trunk sewer twinning along 128th Street south of Highway #10 has yet to be constructed. This report also addresses the adequacy of the additional storm trunk sewer to handle the increased runoff resulting from proposed land use changes within the study area.

2.2.2 Design Criteria

Our review of the relevant reports and studies in the Panorama Ridge area confirmed that the predominant drainage strategy has been to divert large portions of flows away from the steep ravines of the existing creeks. Only two detention ponds exist in the Eugene Creek and Peacock Brook catchments: a stormwater detention pond on the BC Hydro right-of-way, north of 60th Avenue and east of 126th Street, and a community based dry stormwater detention pond on the north side of Highway #10, east of 132nd Street. Our discussions with Hunter Laird Engineering Ltd. confirmed that the recently completed works (year 2002) on the BC Hydro right-of-way stormwater pond included removal of a water quality berm and addition of certain wetland features; no additional effective storage was provided as part of these works. Therefore, our model assumed the pond stage/storage relationship from the original 1997 record drawings. We also understand that there are no plans to construct new detention ponds within the Eugene Creek and Peacock Brook watersheds.

As part of the Design and Construction Drainage Package D54/98, Urban Systems completed the preliminary analysis and subsequent detailed design of the West Newton (South) storm trunk. Storm trunks on 126th Street and 60th Avenue were sized to contain 100-year return period flows in the pipe with no or minor surcharge. This approach was favourable to avoid major overland flow to the properties southwest of 60th Avenue and 126th Street intersection during major storm event.

The City's Design Criteria Manual states that the minor storm drainage conveyance system be designed to convey 5-year return period peak flows without surcharge. Our analysis of required drainage improvements in the study area included options to contain 5-year and 100-year return period peak flows. The 5-year peak flows will be fully contained in trunk sewers proposed to serve as minor system, while a minor surcharge will be allowed during 100-year peak flow event.

To estimate future peak flows, Urban Systems completed the following:

- Review of the future development flow estimates (OCP land use) from relevant reports and studies,

- Calculation of future development flows (West Newton/Highway #10 NCP land use), using Rational Method and the adjusted runoff coefficients from the existing calibrated hydraulic models, and
- Update and rerun of the existing Otthymo model (where applicable) to obtain future development flows (West Newton/Highway #10 NCP land use).

2.2.3 Proposed Land Use and Recommended Drainage Improvements

Presently, the study area represents a mixture of fairly developed areas and suburban residential land uses proposed for future development. All areas proposed for future development under the West Newton/Highway #10 NCP lie within Eugene Creek and Peacock Brook drainage catchments.

Proposed development in Eugene Creek subcatchment include small lots (10 to 13 UPA) south of 60th Avenue and between 124A Street and 125th Street, attached housing (15 UPA) between 125th and 126th Streets south of 58B Avenue, and cluster housing on the east side of 126th Street between Highway #10 and 60th Avenue. As well, the proposed land use includes cluster housing (10 UPA) east and west of the existing detention pond within the BC Hydro right-of-way north of 60th Avenue.

A substantial potential for development exists in Peacock Brook catchment, specifically in the area bounded by the BC Hydro right-of-way to the west, 133rd Street to the east, 61st Avenue to the north and Highway #10 to the south. Development proposals for this area include small lots (10 to 13 UPA), single family (6 UPA), attached housing (15 UPA), seniors housing (20 UPA), a commercial node on SE corner of 128th Street and Highway #10 intersection, and pockets of institutional development. Another development area involving future single family development (6 UPA) is located between 133B Street 135th Street north of Highway #10. The Eugene Creek channel and outfall improvements reduce flows to the Colebrook ditch system, resulting in improved drainage. Upgrades to the Colebrook ditch system are scheduled within the Lowland drainage strategy. Completion of the Eugene works provides adequate system capacity to accommodate the proposed NCP development.

The review of the existing hydraulic models and our discussions with the City confirmed that the previous analysis assumed the proposed land use scenario from the Official Community Plan, City of Surrey, where a majority of the subject area is designated for suburban to light density urban development. The recently approved Stage 1 land use plan for the West Newton/Highway #10 neighbourhood represents a higher density urban development then the OCP land use designation. As a result, the receiving storm sewers, and downstream watercourses, will be subject to increase in peak flows, runoff volume, and frequency.

Table 2.2.1 summarizes the estimated post development peak flows used to size required storm trunk sewer sections within the study area for two scenarios: minor storm sewer system (5-year peak flows) and major storm sewer system (100-year peak flows). **Figure 2.2.1** and **Table 2.2.1** show the required storm sewer sizes to serve each of these two scenarios. These proposed storm trunks are generally located on the north side of Highway #10, and will be used to intercept and direct runoff south of Highway #10 into three existing sewers: 124th Street, 128th Street and 132nd Street storm trunk sewer.

TABLE 2.2.1 - Summary of Postdevelopment Peak Flows and Proposed Storm Trunks/Drainage Works

Designated Storm Trunk/Sewer (under and south of Hwy #10)	Drainage Catchment	Drainage Subcatchment	New Area/Total Area (ha)	Total Area Contributing to Receiving Storm Trunk (ha)	Postdevelopment Peak Flow (OCP Land Use)				Postdevelopment Peak Flow (West Newton/Highway #10 NCP Land Use)				Receiving Storm Trunk/Capacity	Existing sewers surcharge during Q_5? Surcharge: Low, Medium, High, To Ground?	Existing sewers have sufficient capacity to convey Q_5?	Existing sewers surcharge during Q_{100}? Surcharge: Low, Medium, High, To Ground?	Existing sewers have sufficient capacity to convey Q_{100}?	How was peak flow estimated?	Recommendations (to contain minor flows in sewers)	Recommendations (to contain major flows in sewers)
					Q_5 (m^3/s)		Q_{100} (m^3/s)		Q_5 (m^3/s)		Q_{100} (m^3/s)									
					New Area Flow	Total Area Flow	New Area Flow	Total Area Flow	New Area Flow	Total Area Flow	New Area Flow	Total Area Flow								
124 St. Storm Trunk (900 mm dia.)	Eugene Creek Catchment	Area contributing to proposed trunk sewer between 125 St. and 126 St. on Highway #10	40.9	61.0	0.77	1.14	1.76	2.66	0.57	1.04	1.11	2.05	**Existing 900 mm dia.** From 2.40 m^3/s (sewer section under Highway #10) to 4.20 m^3/s (trunk section immediately u/s of 56 Ave.)	No	Yes	No	Yes	Flows obtained from the updated Otthymo model of West Newton (South) NCP area. The OCP Land Use option did not include the stormwater detention pond on 60 Ave., whereas the West Newton/Highway #10 NCP Land Use option assumed the detention pond.	Install 750 mm dia. (@ min. 1% grade) storm trunk sewer on north side of Highway #10 between storm sewer inlet east of 124 St. and 125 St.; Install 675 mm dia. (@ min. 1% grade) storm trunk sewer between 125 St. and 126 St.; Replace 600mm dia. storm inlet and pipe section between 125 St. and 126 St. with 900 mm dia. trunk sewer; Surcharge to ground surface, and overland flow to be conveyed to the west on Highway #10.	Install 900 mm dia. (@ min. 1% grade) storm trunk sewer on north side of Highway #10 between storm sewer inlet east of 124 St. and 125 St.; Install 825 mm dia. (@ min. 1% grade) storm trunk sewer between 125 St. and 126 St.; Replace 600mm dia. storm inlet and pipe section between 125 St. and 126 St. with 900 mm dia. trunk sewer.
		Area contributing to proposed trunk sewer between 124 St. and 125 St. on Highway #10	9.6/50.5		0.20/0.93		0.48/2.19		0.30/0.81		0.53/1.58									
		Area contributing to existing storm sewer on 126A St. north of Highway #10	10.5		0.17		0.39		0.22		0.46									
128 St. Storm Sewer (525 mm dia.)	Peacock Brook Catchment	Area contributing to proposed trunk sewer between 128 St. and 129 St. on Highway #10	27.9	52.2	0.51	0.95	0.77	1.43	0.78	0.95	1.19	1.98	**Existing 525 mm dia.** 0.76 m^3/s	Yes To Ground	No	Yes To Ground	No	Modelled flows from the calibrated model were increased using the adjusted runoff coefficient for the areas proposed for development.	Install flow control structure at Highway #10 and 128 St. intersection to equally utilize storm sewers on 128 St. during peak flow events; Construct 675 mm dia. storm trunk (@ min. 0.7% grade) on the north side of Highway #10 between 128 St. and 129 St.; Construct 375 mm dia. parallel storm trunk sewer on west side of 128 St. south of Highway #10 (d/s of 600 mm dia. trunk section) to 56 Ave.; Surcharge to ground surface, and overland flow to be conveyed to the south via 128 St.	Install flow control structure at Highway #10 and 128 St. intersection to equally utilize storm sewers on 128 St. during peak flow events; Replace 450 mm dia. culvert under Highway #10 with 675 mm.dia. trunk sewer; Construct 825 mm dia. storm trunk (@ min. 0.7% grade) on north side of Highway #10 between 128 St. and 129 St.; Construct 600 mm dia. parallel storm trunk sewer on west side of 128 St. between Highway #10 and 56 Ave.
		Area contributing to existing storm sewer on 128 St. north of Highway #10	24.3		0.44		0.66		0.52		0.79									
132 St. Storm Sewer (525 mm dia.)	Peacock Brook Catchment	Area contributing to two 450 mm dia. sewers under Highway #10 on 132 St.	18.3	18.3	0.73	0.73	1.10	1.10	0.93	0.93	1.40	1.40	**Existing 525 mm dia.** 0.85 m^3/s	Yes Low	Yes	Yes High	Yes	Modelled flows from the calibrated model were increased using the adjusted runoff coefficient for the areas proposed for development. Peak flow estimate assumed the community dry detention pond in place.	525mm dia. storm sewer on 132 St. will experience high surcharge conditions if the existing community dry detention pond east of 132 St. is abandoned; Replace 2 x 450 mm dia. culverts under Hwy #10 with 750 mm dia. trunk sewer. Install 675 mm dia. (@ min. 1% grade) storm trunk sewer between 132 St. and 133A St.; Surcharge to ground surface, and overland flow to be conveyed to the south via 132 St.	Maintain existing community dry detention pond east of 132 St.; Replace 2 x 450 mm dia. culverts under Hwy #10 with 750 mm dia. trunk sewer; Replace 450 mm dia. sewer section on 132 St. immediately north of 56 Ave. with 525 mm dia. sewer; Install 750 mm dia. (@ min. 1% grade) storm trunk sewer between 132 St. and 133A St.; Surcharge to ground surface, and overland flow (if any) to be conveyed south via 132 St.

In addition to new storm trunk construction, the following drainage works are required:

- Install flow control structure at 128th Street and Highway #10;
- Replace twin 450 mm diameter culverts on 132nd Street under Highway #10 with single 750 mm diameter storm trunk sewer;
- Replace 600 mm diameter storm inlet and pipe section on north side of Highway #10 east of 124th Street with 900 mm diameter storm trunk sewer; and
- Install 380 m of 375 mm diameter twin storm sewer on 128th Street between Highway #10 and 56th Avenue.

We propose that the stormwater conveyance system between 62nd Avenue and 56th Avenue be designed to handle 100-year peak flows with no allowance for overland flow. The capital investment increase over minor conveyance system is considered minor and includes the following items:

- Increase proposed storm trunk sewer sizes along Highway #10 (north side) to contain major flows;
- Replace 450 mm diameter culvert on 128th Street under Highway #10 with 650 mm diameter storm trunk sewer;
- Replace 45 m of 450 mm diameter storm sewer on 132nd Street immediately north of 56th Avenue with 525 mm diameter storm sewer; and
- Increase twin storm sewer diameter from 375 mm to 600 mm on 128th Street between Highway #10 and 56th Avenue.
-

The detailed design of the proposed storm sewer sizes must confirm that the 100-year HGL in the surcharged sewer sections is below minimum building elevations.

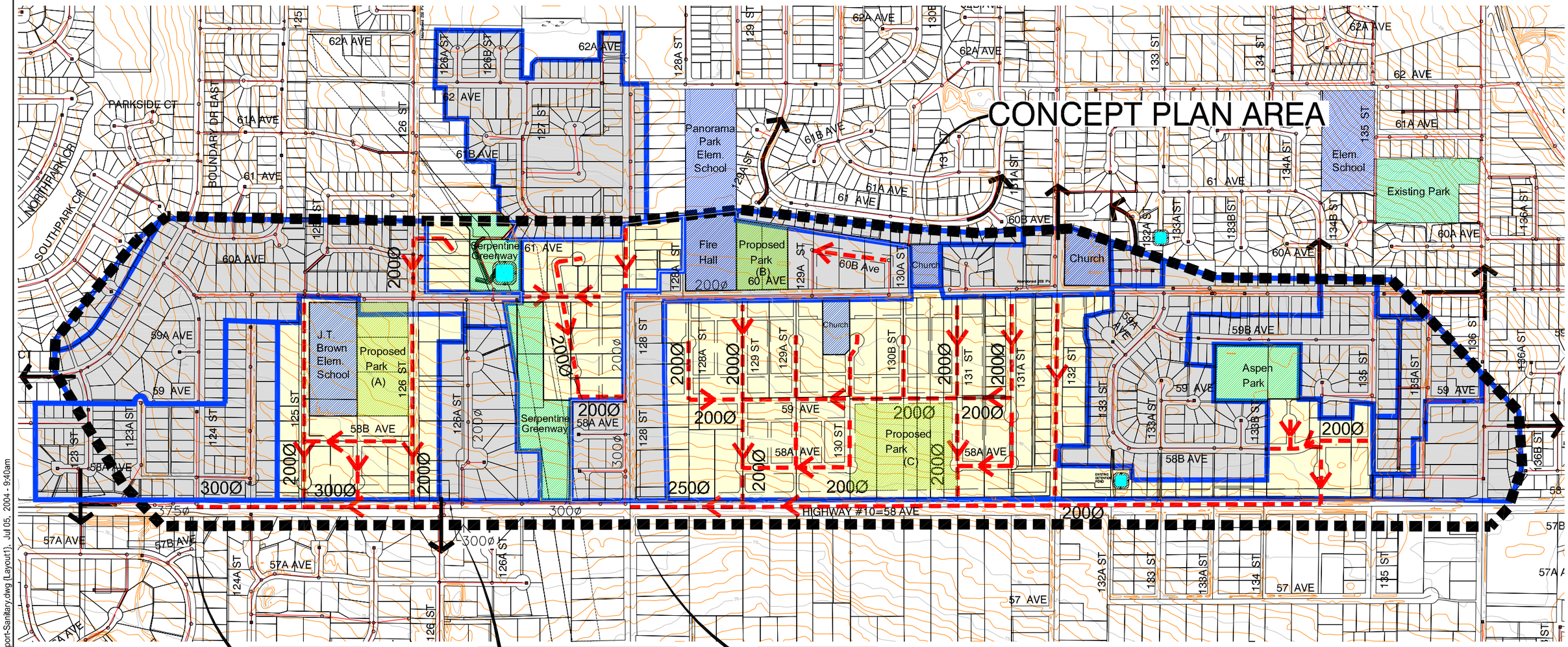
2.3 Sanitary

2.3.1 Opportunities & Constraints

As stated in the previous Section, the concept plan area contains a large central suburban residential portion proposed for future development. Developed areas with an established community sanitary system exist in the west and east part of the study area, as well as between 126th and 128th Streets south of 60th Avenue. Other areas, including a large central area between 128th and 132nd Streets, are fairly undeveloped and mostly rely on private septic tanks. **Figure 2.3.1** identifies areas based on the availability of the existing community sanitary system.

All of the identified catchments are tributary to the existing GVS&DD sanitary interceptor trunk located in the low lying lands south of the study area. These areas are served by a gravity sanitary sewer system that conveys sanitary flow under Highway #10 and further southward through two trunk sewers: 200 mm diameter sewer on 126th Street and 375 mm diameter sewer on 123rd Street.

During the course of the project, Urban Systems has confirmed with the City that the designated trunk sewer for the West Newton/Highway #10 catchment is the existing 375 mm diameter trunk on 123rd Street. Therefore, our main objective was to investigate the capacity of this trunk sewer to serve the proposed development within the study area.



Tie to existing 375mmØ trunk

Disconnect ex. 300mmØ trunk from 300mmØ pipe under hwy #10. construct sanitary overflow structure.

Tie to existing 300mmØ trunk

LEGEND:

- Concept Area Plan
- Existing Catchment Boundary
- Area currently Serviced
- Area not Serviced by Existing Sanitary
- Existing Catchment Flow Direction
- 300ø — Existing Sanitary Sewers
- Proposed Sanitary Sewers
- Ømm — Pipe Diameter in millimeters

0 500

Meters

N

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WEST NEWTON/HIGHWAY #10 NEIGHBOURHOOD CONCEPT PLAN

SANITARY

PROJECT No : 1072.0099.01

DATE : JUNE, 2004

FIGURE 2.3.1

2.3.2 Servicing Options

The City of Surrey provided a population breakdown for both the existing development, and areas proposed for future development. As a result, the sanitary sewage flows were determined using the existing population density of 32 persons per hectare complemented by total population estimates for each density zone as proposed in the approved Stage 1 land use plan for the West Newton/Highway #10 concept plan area.

Calculations of sanitary design flows were completed in accordance with the Design Criteria Manual, City of Surrey, January 2002. The Average Day Dry Weather Flow (ADWF) was assumed at 350 l/person/day, while the Peak Wet Weather Flow (PWWF) included Harman peaking factor and infiltration inflow estimates as recommended in the Design Criteria Manual.

In order to identify all previously proposed sanitary system projects within the study area, Urban Systems reviewed the 2001 – 2010 Servicing Plan, City of Surrey, August 2001. We were able to identify only one project proposal (Project ID Number 7324) within the study area. The project involves construction of 475 m of 375 mm diameter sanitary trunk between 124th Street and 126th Street. This location represents a designated sanitary trunk alignment for the study area, and was therefore included in the proposed sanitary sewer servicing scheme. However, we found that a smaller size, 300 mm diameter trunk, between 124th Street and 126th Street would efficiently serve areas upstream of 126th Street/Highway #10 intersection.

Appendix B and **Figure 2.3.1** summarize the proposed sanitary sewer alignments, calculated sanitary flow rates and required sewer sizes within and downstream of the areas proposed for development. The flow estimates and recommended sizes were provided for all required sewers and generally follow the proposed road alignments as identified in the approved Stage 1 land use plan. This was done to ensure that no sewers smaller than minimum required size of 200 mm diameter are proposed for residential lands.

The sewer flow calculation sheet assumed “as constructed” grades for the existing sewers while the proposed sewers was approximated using the slope of the existing ground. In accordance with the City of Surrey’s Design Criteria Manual, all sewers have been sized on the basis of flowing 50% full at the peak flow rate for the ultimate development.

2.3.3 Conclusions and Recommendations

We confirmed the adequacy of the existing downstream 375 mm diameter trunk to handle future sanitary flows from the study area. Our analysis included the trunk section from 124th Street and Highway #10 intersection to 56th Avenue and 122nd Street intersection.

As per the City of Surrey criteria, the minimal flow velocity of 0.6 m/s must be achieved in all sewers for self-cleansing purposes at least once daily, during Peak Dry Weather Flows (PDWF). **Appendix B** lists 10 sanitary sewer sections not satisfying these criteria, with maximum daily velocities ranging from 0.37 to 0.58 m/s. Detailed design of these sections must include slightly steeper grades than the corresponding ground to achieve required velocity.

All sanitary flows from the developing areas will be intercepted by the proposed sewer on the north side of Highway #10, and conveyed by gravity through the existing 375 mm diameter trunk along Highway #10 and 122nd/123rd Streets south of Highway #10. As mentioned before, the existing 200 mm diameter sanitary sewer crosses Highway #10 approximately 50 m east of 126th Street. This sewer services two pockets of development north of Highway #10 between 126th Street and 128th Street. Although sanitary flows will be conveyed along Highway #10 to the west, we recommend that this sanitary sewer remains operational. It may act as a relief capacity for the future system by introducing a sanitary overflow structure at its location. As well, this connection can also be utilized as a temporary flow route during construction, maintenance and repair of the proposed 300/375 mm diameter trunk on Highway #10.

The extension of 58B Avenue from 133B Street to 135th Street will include a local sanitary sewer. To service the southern portion of the proposed southern cul-de-sac off 58B Avenue a sanitary sewer must be extended along Highway 10 from 132nd Street. This expense may be avoided by removing the cul-de-sac and keeping the current alignment of 58B Avenue. This will result in less lot yield for this small catchment. Accurate site survey is required to confirm the exact servicing needs for this area due to topographic constraints at this end of the sanitary service catchment.

The recommended pipe sizes and slopes are the minimum required to properly serve future development. Sewer capacity must be re-evaluated should any of the proposed sewers be reduced in size or set on a grade milder than the corresponding ground.

2.4 Water

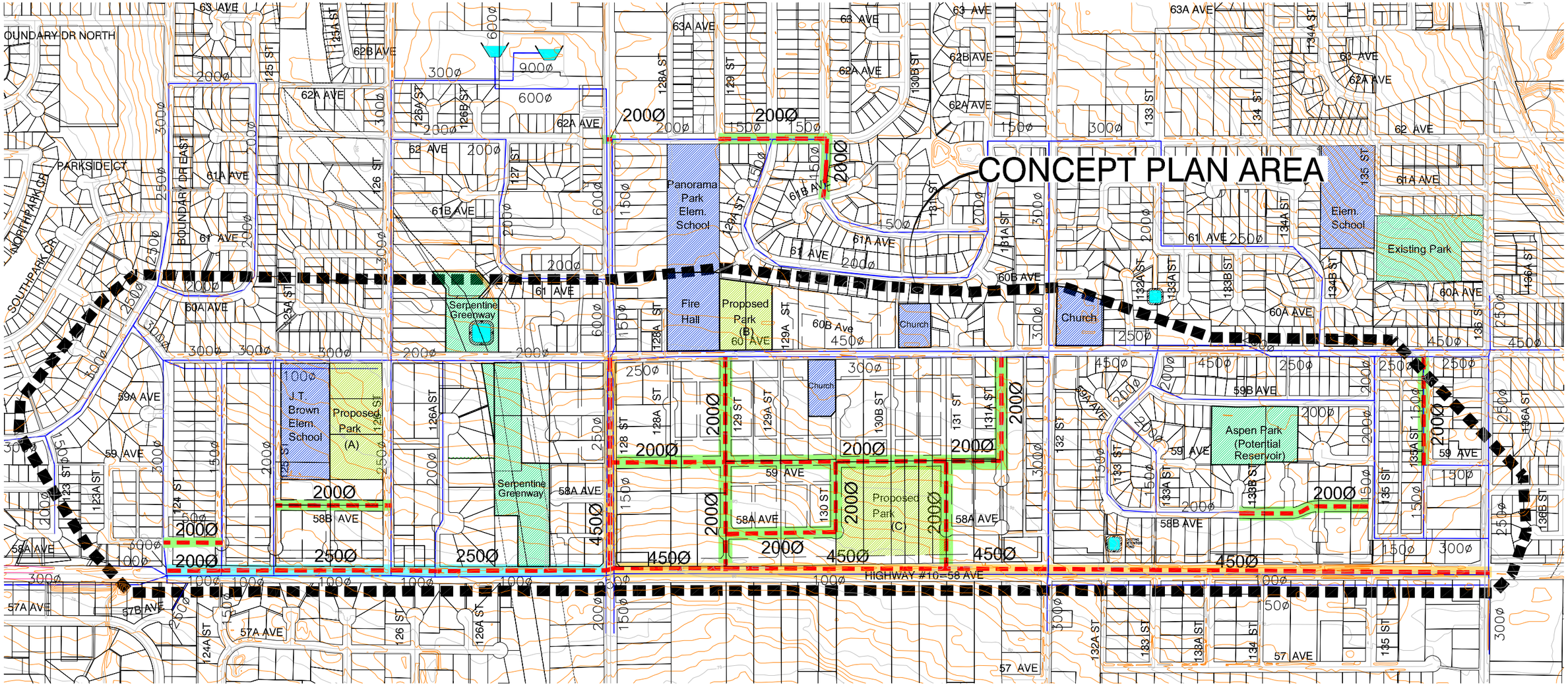
2.4.1 Existing System

The West Newton/Highway #10 concept area receives water from Newton reservoirs located approximately 500 metres to the north, on 62B Avenue at 127th Street. Two feeder watermains located on 126th Street (300 mm diameter) and 128th Street (600 mm diameter) distributes water into the study area. At 60th Avenue these feeder mains split into smaller size distribution mains that supply water to population both within and surrounding the study area.

A 750 mm diameter feeder main runs along 128th Street in the southerly direction. Upon review of "as constructed" drawings, we concluded that the 750 mm diameter feeder main is not connected to any of the existing watermains and was therefore not included in the subsequent analysis.

The watermain network is fairly developed in the west and east portions of the study area where most of the existing development is located. However, watermains only exist along the major roadways in the central undeveloped portion (bounded by Highway #10, 60th Avenue, 128th Street and 132nd Street). **Figure 2.4.1** outlines the existing watermain network included in the analysis.

The entire study area lies entirely within the 135 m pressure zone. Therefore, neither the existing nor future water distribution system require pressure zone separation within the study area by employing Pressure Booster and PRV stations.



LEGEND:

- Concept Plan Area
- 100Ømm — Ex.Modelled Watermain & Pipe Size
- 450Ømm — Prop. Feeder Mains & Pipe Size
- 250Ømm — Prop. Major Grid Mains & Pipe Size
- 200Ømm — Prop. Distribution Mains & Pipe Size
- Ømm — Pipe Diameter in millimeters

0 — 500 Meters

N

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WATER

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DATE : JUNE, 2004

FIGURE 2.4.1

2.4.2 Water Network Modelling Approach

Urban Systems developed a WaterCAD model of the study area to investigate impacts of the proposed development to the existing system, as well as to determine modifications necessary to adequately serve the study area. **Figure 2.4.2** illustrates the proposed distribution system model schematic along with the labelling system of all model components.

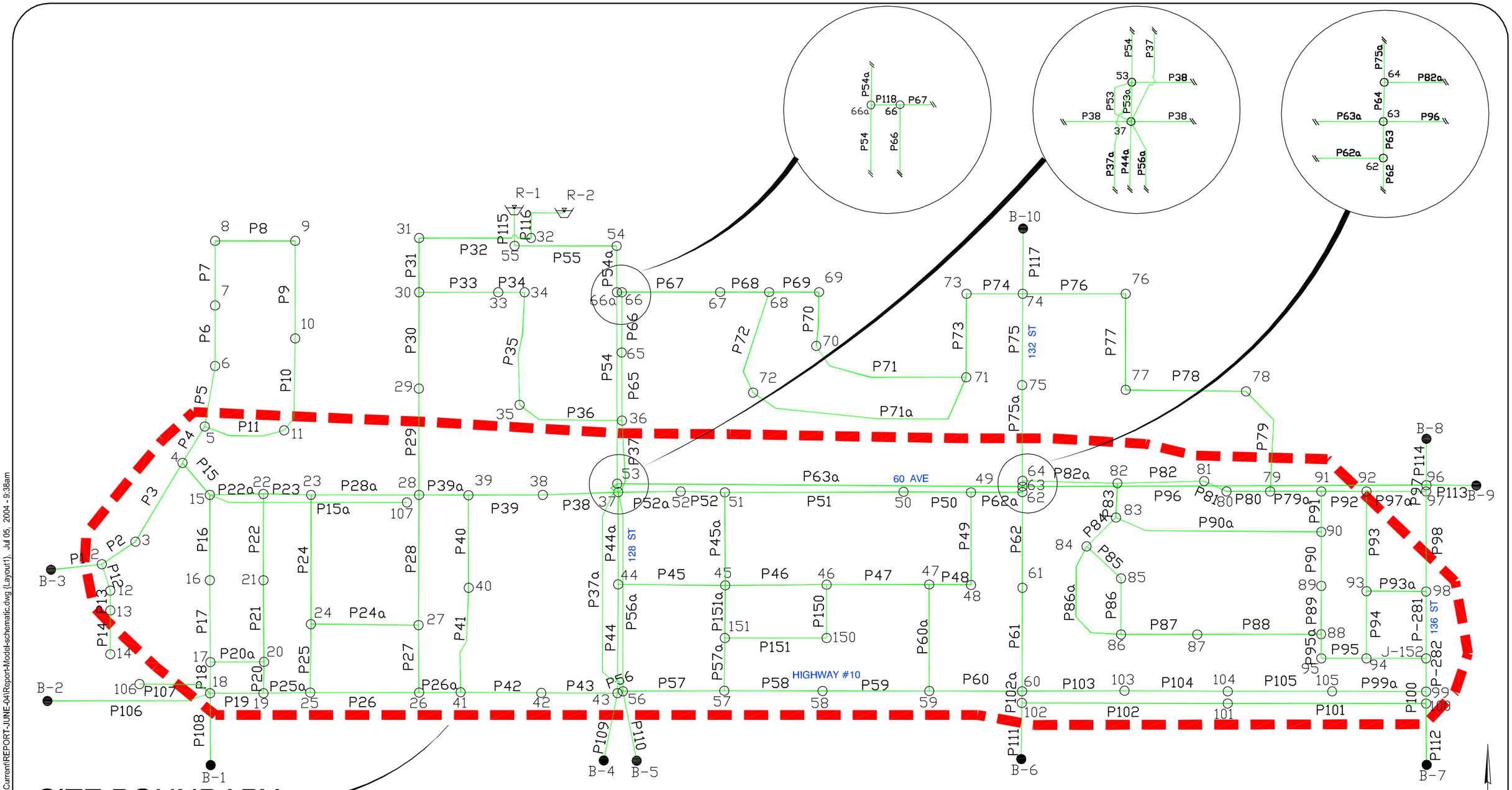
The model set up was based primarily on information obtained from the City's "as constructed" drawings. Where the watermain invert was not available, known watermain inverts were used to interpolate the missing information. Due to proximity of supplying water reservoirs, the minimum water levels in the reservoirs were set to 135m HGL in the model. This is in accordance with the design static head elevations illustrated in Figure 3.1 of the City's Design Criteria Manual.

For the demand calculation, the study area was divided into more than a hundred small areas based on the Stage 1 land use plan provided by the City. A population, or an equivalent population for the case of commercial, industrial, and institutional land use, was then determined individually for each of these areas. The water demands were then calculated based on the following values given in the City's Design Criteria Manual:

Maximum Day Demand	Peak Hour Demand
1000 L/capita/day	2000 L/capita/day

In addition to servicing the study area, the modelled water distribution system also supplies water to areas outside the study area boundary. The demands of these areas were estimated based on catchment population and assigned to ten nodes located at the boundary of the study area. In order to offset the potential population increase between now and 2020, we assumed a 15% increase over the present population numbers for these areas.

We created two modelling scenarios for the Stage 1 land use plan scenario: the peak hour demand scenario, and the maximum day plus fire flow demand scenario. The fire flow demand requirements from the City's Design Criteria Manual were used to determine the fire flow required for each node in the model.



WEST NEWTON/HIGHWAY #10 NEIGHBOURHOOD CONCEPT PLAN WATER DISTRIBUTION SYSTEM MODEL SCHEMATIC OF PROPOSED SYSTEM

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DATE : JUNE, 2004

FIGURE 2.4.2

2.4.3 Proposed Water Distribution System

There have been several proposed projects involving the water distribution system upgrades within the study area. These projects are listed in the City's 10 Year Servicing Plan as follows:

- Replace 1600 m of existing 100 mm diameter watermain along Highway #10 (N) from 128th Street to 136th Street with 450 mm diameter watermain (10 Year Servicing Plan Project ID 5227)
  Status: Not Completed
- Replace 85 m of existing 50 mm diameter watermain along 58A Avenue from 124th Street to 124A Street with 200 mm diameter watermain (10 Year Servicing Plan Project ID 5228)
  Status: Not Completed
- Replace 240 m of existing 150 mm diameter watermain along 135A Street from 59th Avenue to 60th Avenue with 200 mm diameter watermain (10 Year Servicing Plan Project ID 5183)
  Status: Not Completed
- Construct 210 m of 250 mm diameter watermain along 60th Avenue from 135th Street to 136th Street to replace the existing 100 mm diameter watermain (10 Year Servicing Plan Project ID 7676)
  Status: Completed
- Replace 390 m of existing 150 mm diameter watermain along 136th Street from Highway #10 to 60th Avenue with 250 mm diameter watermain (10 Year Servicing Plan Project ID 4954)
  Status: Completed
- Replace 195 m of existing 100 mm diameter watermain along 131A Street south of 60th Avenue with 200 mm diameter watermain (10 Year Servicing Plan Project ID 5165)
  Status: Not Completed

In addition, the City's Engineering Department confirmed that a 450 mm diameter feeder main will also be required on 128th Street to increase supply capacity to the proposed Highway #10 450 mm diameter feeder main. All of the above proposed water distribution system upgrades have been included in the future water distribution system analysis and recommendations for future system upgrade.

Based on the water system modelling results, the modifications required to accommodate the proposed development referred to as the approved West Newton/Hwy #10 land use plan are shown in **Figure 2.4.1**:

- Replace 1600 m of existing 100 mm diameter watermain along Highway #10 from 128th Street to 136th Street with 450 mm diameter watermain;

- Replace 85 m of existing 50 mm diameter watermain along 58A Avenue from 124th Street to 124A Street with 200 mm diameter watermain;
- Replace 240 m of existing 150 mm diameter watermain along 135A Street from 59th Avenue to 60th Avenue with 200 mm diameter watermain;
- Replace 85 m of existing 100 mm diameter watermain along Highway #10 (N) from 124th Street to 124A Street with 200 mm watermain;
- Replace 620 m of existing 100 mm diameter water mains along Highway #10 from 124A Street to 128th Street with 250 mm diameter watermain;
- Install 400 m of 450 mm diameter watermain along 128th Street from Highway #10 to 60th Avenue; and
- Replace 195 m of existing 100 mm diameter watermain along 131A Street south of 60th Avenue with 200 mm diameter watermain.

In addition to the above system improvements, it was determined that a looped network of 200 mm diameter watermains will be required to distribute water to the proposed development in the centre of the study area, between 128th Street and 132nd Street In the east portion of the study area, a 250 m section of 200 mm diameter watermain along 58B Avenue from 133B Street to 135th Street will be needed to complete the loop of the network. Moreover, a proposed section of 200 mm diameter water main along 58B Avenue between 125A Street and 126th Street will also be needed in the west portion of study area.

And finally, due to the increase in demand to the system, some modifications will be required to maintain fire flow with adequate pressure to some existing developments north of the study area. A 200 mm diameter connection will be needed to convey flow from the 600 mm diameter watermain across 128th Street to the 200 mm diameter watermain on 62nd Avenue. In addition, the upgrade of a section of the existing 150 mm diameter water main, located east of the proposed connection, to 200 mm diameter will be needed.

Although the modelling results confirmed that two nodes (#106 & #107) on the existing “dead end” 100 mm diameter watermains failed the fire flow requirement, it should be noted that both of these nodes are adjacent to larger diameter mains. Moreover, these watermains do not meet the minimum diameter size to serve fire hydrants. Therefore, adequate fire flow to the areas surrounding these nodes will be provided via hydrants connected to the larger diameter mains.

The summary of input parameters and modelling results for the peak hour demand scenario and the maximum day plus fire flow demand scenario are included in **Appendix C**.

3.0 DEVELOPMENT PHASING

Surrey City Council has approved the Stage 1 land use plan for the West Newton/ Highway #10 NCP area. Based on this land use form a phasing plan for the NCP area is discussed in this section of the report.

Most of the interim major infrastructure necessary to service the NCP area currently exists. The exceptions to this are the lack of specific waterman's and sanitary sewers along Highway #10. Major infrastructure here is defined as trunk storm and sanitary sewers, grid water mains and interim arterial and collector roads. Local servicing infrastructure must also be put in place as development proceeds.

The downstream sanitary sewers required to service the area are in place. Some local mains on Highway #10 will need to be built to collect sewage from the NCP and direct it to these downstream trunks. There are many local pockets that do not have sewers at this time. As development proceeds sewers will be extended by developers to service the NCP. This will permit many homes the option to remove their septic system and connect to be sewers. Connection to new sewers will likely be through resident initiated local improvement projects or latecomer agreements with developers in the area. Some areas will still have to have specific local improvements to extend sewers as they are currently developed areas with limited future development potential.

Watermains are also required to service the area. The major feeder main to be built is on Highway #10. This main and a new main on 128th Street will complete the required feeder system. Various distribution mains are also required for the area.

Stormwater management for the NCP area is divided into two catchments; the Eugene Creek and Peacook Brook catchments. Various trunk sewers are required on Highway #10 to connect the major flow from the NCP area to the downstream system. Eugene Creek outfall will provide lowland capacity for potential flow increases resulting form densification of the existing tributary lands. Development applications within the NCP may proceed only after the works are in place.

The existing collector and arterial road system services the need of the existing community. Highway #10 is planned to be expanded in 2006. This will help to reduce the amount of traffic using 60th Avenue as an alternative to Highway #10. As the NCP area and the surrounding neighbourhood grow the arterial roads will be expanded. Improvements for pedestrians on 60th Avenue will have to come sooner. The proposed traffic calming improvements will help address the existing residents concerns and future traffic patterns.

Based on the engineering analysis completed, development will likely grow from the existing services at Highway #10 and 128th Street and from the existing services on 60th Avenue. In both areas the interim services that do exist will have to be expanded to service the NCP.

Because the centre area between 128th Street and 132nd Street has no internal services today we believe that as development radiates out from the southwest corner the local services will be extended. This will optimize the use of the downstream improvements on Highway #10 necessary to allow the NCP to develop.

4.0 INFRASTRUCTURE FINANCING AND FUNDING

The City of Surrey has taken the following approach to infrastructure funding in the NCP area.

1. The long-term DCC revenues and expenditures for major collector roads, water, sanitary and drainage works will likely balance or show a positive cash flow at buildout. Arterial road widening is assumed to be funded over time through DCCs and not DCCs solely generated from the NCP area. This applies to DCC revenues and expenditures within the NCP area. If the NCP's total DCCs are less than the expenditures, the NCP may still go ahead but the costs above the revenues generated through the specific NCP DCCs will only be provided by the City when the works become a City priority.
2. The short-term annual DCC revenues and expenditures must also balance or the development community within the NCP must address the short-term cash flow problem.
3. The City will not fund interim works.
4. The City-wide based DCC collection and expenditure program is the basis of all DCC capital works.

Many of the works identified to service the NCP area are within the current 2001-2010, 10-Year Engineering Servicing Plan. The infrastructure to service the complete West Newton/ Highway #10 is **not** in the 10-year capital plan. In this section we recommend additions to the 10-year capital plan.

The major engineering infrastructure costs (e.g. DCC works) to service the West Newton plan area is estimated at $2.62 million. This cost does not include the local servicing costs that must be borne by the local development community and includes some cost sharing.

This section of the report describes the major works required, DCC revenues and projected expenditures and cash flow analysis.

4.1 DCC Elements

The 2001 – 2010 City of Surrey's 10-Year capital plan includes engineering works which are required for both the existing and future needs of the community. Typically the existing needs are funded from general revenue monies or grants and infrastructure required for growth is principally (90% or more) funded by developers through Development Cost Charges (DCCs).

The City will only fund works which are included in the 10-year plan and DCC program. DCC works can either be built by the City or developers. Given the huge size of the DCC program and the time requirements for

infrastructure to be built, developers do build many of the DCC works and receive DCC rebates/credit for the works they build.

The City has specific criteria for a work to be included as a DCC element in their program. **Figure 4.1** shows the NCP servicing requirements. **Tables 4.1a through 4.1c** list each proposed eligible DCC item by service. Each item is broken down to show the estimated cost, type of proposed funding, suggested method of construction (by Surrey or developers) and the time period the work is required.

CONCEPT PLAN AREA

Widen 60 Avenue to 2 lanes plus bicycle lanes and one-side parking.

Replace 600mm Ø storm inlet and pipe section with 900mm Ø sewer.

Install flow control structure.

Proposed 4-laning of Highway 10

Replace twin 450mm Ø culverts under Hwy #10 with single 750mm Ø sewer.

Replace 450mm Ø culvert under Highway #10 with 650mm Ø storm sewer; Install 600mm Ø parallel storm trunk on west side of 128 St. between Highway #10 and 56 Ave.

Replace 450mm Ø storm sewer section immediately north of 56 Ave. with 525mm Ø sewer.

Proposed Cul-de-Sac on 124A Street and 125 Street at Highway 10

900Ø 825Ø 250Ø 450Ø 450Ø 750Ø

Panorama Park Elem. School
Fire Hall
Serpentine Greenway
J.T. Brown Elem. School
Proposed Park (A)
Proposed Park (B)
Proposed Park (C)
Elem. School
Existing Park
Aspen Park
Church
HIGHWAY #10=58 AVE
SOUTHPARK DR
BOUNDARY DR EAST

LEGEND:

- Concept Plan Area
- Provincial Highway
- Arterial Road
- Major Collector
- Proposed Watermain
- Proposed Storm Trunk Sewer
- Proposed Traffic Circles
- Proposed Traffic Signals
- Pedestrian Crossing Improvements

0 500 Meters

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WEST NEWTON/HIGHWAY #10 NEIGHBOURHOOD CONCEPT PLAN

MAJOR ENGINEERING INFRASTRUCTURE

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FIGURE 4.1

N

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

The year each item is required is included to clarify when works are necessary, based on the needs of the NCP area development.

(Note that the proposed timing shown is based on projected development needs. The actual timing of construction by Surrey may differ. Only those DCC elements in the *current* 10-year plan [DCC elements] may receive DCC rebates / credits as per the current City policy. The proposed works in the NCP will be eligible if they are added to the 10-year plan [DCC elements]. The City is planning to update the 10-year servicing plan in 2004.)

Table 4.1a
WEST NEWTON / HIGHWAY #10
NCP INFRASTRUCTURE FINANCING AND FUNDING

ROADS AND TRANSPORTATION

Item (Estimates) (Location) (1)	Type/Size of Works	Current or Addition	ID # Current 10 Year Plan	Amount Current Program (2001 $)	Additions to Program (Current $)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Addition to DCC Program	Construction by (Surrey/Dev.)	Year Requested
Highway #10 ($3 million)	Urban Features	Current	7501	Portion of $3 million	0	Y	N	N	Prov.	2005-2007
128th Street ($575,000)	Ult. Art. Widening	Addition	N/A	0	$575,000	Y	N	N	Surrey	Beyond 2021
132nd Street ($575,000)	Ult. Art. Widening	Addition	N/A	0	$575,000	Y	Y	N	Surrey	Beyond 2021
60th Ave ($2.34 mill.)	Ult. Coll. Widening	Addition	N/A	0	1.17 million	Y	N	Partial	Dev./Surrey	2005-2010
132nd St./60th Ave. ($130,000)	Ult. Traffic Signal	Addition	N/A	0	$130,000	Y	N	Partial	Surrey	When Warranted
128th St./60th Ave. ($130,000)	Ult. Traffic Signal	Addition	N/A	0	$130,000	Y	N	Partial	Surrey	When Warranted
60th Ave Three Locations	Ped. Crossing Improv.	Addition	N/A	0	Included in 60 Ave. upgrade	Y	N	Partial	Dev.	2005-2021
124th St./60th Ave. ($50,000)	Traffic Circles (2)	Addition	N/A	0	$25,000	Y	N	Partial	City	2005-2010

(1) Estimates are based on unit costs. All estimates include a 30% contingency.
The 60th Avenue total cost is 2.34 million. One half has been allocated to this NCP.
The total cost of the traffic circles is estimated at $50,000. One half has been allocated to this NCP. Also one half of the signals have been allocated to the NCP.
Traffic signals included as arterial road elements.

Table 4.1b
WEST NEWTON/ HIGHWAY #10
INFRASTRUCTURE FINANCING AND FUNDING

WATER

Item **(Total Cost Estimates)** (Location)	Type/Size of Works	Current or Addition	ID # Current 10 Year Plan	Amount Current Program (2001 $)	Additions to Program (Current $)	Eligible[3] for DCC Program (Y/N)	Refinement of DCC Program	Addition to DCC Program	Construction by (Surrey/Dev.)	Year Requested
Highway #10/ 128 St. – 136 St. ($836,000)	Main (450 mm)	Current	5227	$368,000 of $836,000	0	Y	N	N		2005 – 2010
Highway #10/ 124 St. – 124A St. ($32,000)	Main (200mm)	N/A		0	0	N	N	N	Dev.	2005 – 2010
Highway #10/ 124A St. – 128 St.	Main (250mmm)	Addition (upsizing only)		0	$90,000	Y	N	Y	Dev.	2005 – 2010
58A Ave./ 124 St. – 124A St. ($32,000)	Main (200mm)	(N/A)	5228	$32,000	0	N	N	N	Dev.	2005 – 2010
58B Ave./ 125 St. – 126 St. ($80,000)	Main (200mm)	(N/A)		0	0	N	N	N	Dev.	2005 – 2010
128 St./ 60 Ave. - #10 ($252,000)	Main (450mm)	Addition		0	Under construction	Y	N	Y	Surrey	2004
58B Ave./ 133B St. – 135 St. ($80,000)	Main (200mm)	(N/A)		0	0	N	N	N	Dev.	2005 – 2010
135A St./ 59 Ave. – 60 Ave. ($89,000)	Main (200mm)	Current	5183	$89,000	0	N	N	N	Dev.	2005 – 2010
131A St./ 59 Ave. – 60 Ave.($72,000)	Maim (200mm)	Current	5165	$72,000	0	N	N	N	Dev.	2005 – 2010

Table 4.1c
WEST NEWTON/ HIGHWAY #10 NCP
NCP INFRASTRUCTURE FINANCING AND FUNDING

STORMWATER

Item (Estimates) (Location) (1)	Type/Size of Works	Current or Addition	ID # Current 10 Year Plan	Amount Current Program (2001 $)	Additions to Program (Current $)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Addition to DCC Program	Construction by (Surrey/Dev.)	Year Requested
Highway #10/ 124 St. – 126 St. ($350,000)	Trunk (825mm/ 900mm & 825mm inlet)	Current	5464	$332,000	N	Y	N	N	Dev.	
Highway #10/ 128 St. – 129 St. ($208,000)	Trunk (825mm)	N/A		0	0	N	N	N	Dev.	2001-2010
Highway #10/ 132 St. – 133A St. ($250,000)	Trunk (750mm)	N/A		0	0	N	N	N	Dev.	2001-2010
128 St./ Hwy #10 to 56 Ave ($308,000)	Trunk (600mm)	Current	6642	0	$190,000	Y	Y	N	Dev.	2001-2010
132 St./ N. of 56 Ave ($41,000)	Trunk (525 mm)	Addition		0	$41,000	Y	N	Y	Dev.	2001-2010
128 St./ Hwy #10 ($30,000)	Flow Control	Addition		0	$30,000	Y	N	Y	Dev.	2001-2010
Highway #10/ 132 St. ($58,500)	Crossing (750mm)	N/A		0	0	N	N	N	Dev.	2001-2010
Highway #10 ($52,000)	Crossing (650mm)	Addition		0	$52,000	Y	N	Y	Dev.	2001-2010
Colebrook Pump Station ($1.9 million)	Lowland Ditch Upgrades (10%)	Addition		0	$190,000	Y	N	Y	Dev.	2001-2010
Eugene Creek Diversion ($800,000)	Lowland Ditch Upgrades (37%)	Addition		0	$296,000	Y	N	Y	Dev.	2001-2010

(1) Estimates are based on unit costs. All estimates include a 30% contingency.

4.2 Unit and Population Estimates

The planning and development department have provided the following unit and population estimates corresponding to the Stage 1 approved land use plan. The following table summarizes the number of units used in our DCC revenue estimate.

Plan Area	Existing Dwelling Units(2)	Estimated Existing Population	New Dwelling Units(2)	Additional Population or Area
Single Family	436	1620	760	2,450
Multi Family			150	390
Senior Housing			40	40
Commercial				52,000 ft^2

(1) Information presented was provided by the Planning & Development Department, Stage 1 NCP.

4.3 NCP Plan Area Preliminary Engineering Servicing Costs

The works discussed in this section and the costs identified are for major engineering infrastructure. The full cost of local servicing is the responsibility of the developer. Major infrastructure costs are often shared with the City or through development cost charges collected in the neighbourhood or throughout the City.

Roads

The area is currently serviced by a series of local, collector and arterial City roads and Highway #10. The proposed arterial and collector road improvements and the intersection signalization on 60th Avenue will be required as the area develops and traffic warrants the improvements. More immediate road concerns include the 60th Avenue pedestrian crossing improvements and the traffic circles at 124th Street and 60th Avenue. The cost to complete the collector road improvements, pedestrian crossings, and traffic circles and signalization is estimated at $1.48 million. We suggest that these improvements partially service the larger local community, are an existing concern which needs to be addressed or are part of the arterial road program (signals). Therefore we are recommending that only one half of these costs be assigned to this NCP area, a total of $1.195 million.

The Ministry of Transportation is currently in the design phase of the proposed expansion of the Highway #10 to four lanes. Their proposed schedule includes going to construction in 2006 with completion likely in 2007/ 2008.

Sanitary

The NCP area is defined by the local catchments that can be serviced by gravity sewers. In order to service the NCP improvements to the existing Highway #10 sanitary sewer and new sewers are required. The cost of the

major NCP Plan area sanitary sewers is estimated at $86,000. This is not a trunk sewer and therefore not an eligible DCC item. To service the planned cul-de-sac development on 58B Avenue near 135 Street a long sewer extension is required along Highway #10. This is a local servicing cost and is not part of the City's trunk sewer system.

Water

A significant number of new watermains are required to service the ultimate needs of the NCP area. Specifically grid watermains, and the construction of a major 450 mm ø main from 128th Street to 136th Street. Water mains on 128th Street and 135A Street are required to service the NCP Plan Area. A number of watermains are already in the 10 year plan. Only the Highway #10 250mm diameter grid main is eligible for DCC upsizing contribution. All 200mm diameter mains are the responsibility of the local developer. The additional cost to provide water service for the NCP area is estimated at $90,000.

Stormwater

The additional stormwater trunks required for the area have been for the most part already identified in past studies. We have included the cost of ensuring that the 100 year storm event will be contained in the piped system. Significant stormwater trunk sewers are required along Highway #10 and downstream of the NCP area. Only storm sewers servicing a catchment equal to or greater than 20 hectares are eligible as a DCC element. The additional cost to provide stormwater service for the NCP area is estimated at $799,000.

Based on the approach identified above, the following table summarizes the servicing costs for the NCP Plan Area. The details of the cost estimate are provided in **Table 4.1a – 4.1c.**

Sanitary Sewer	$ 0
Water	$ 90,000
Drainage	$ 799,000
Roads	$ 1,195,000
TOTAL	**$ 2,084,000**

Note: This cost does not include local servicing costs.

4.4 DCC Revenues and Expenditures

The following table summarizes the projected DCC revenues and construction costs for each engineering service. The revenues are based on the current DCC bylaw. Growth projections are based on the build-out of the NCP Plan Area for a total of 950 units. The detailed DCC revenue calculation is shown in Appendix D. Both costs and revenues are in 2004 dollars.

Table 4.2
Projected DCC Revenues and Expenditures at Build-out (1)

	Projected DCC Revenues	Projected Additional DCC Expenditures	Surplus Balance (Deficit Balance)
Sanitary Sewer	$709,686	$0	$709,686
Storm Sewer	$1,933,654	$799,000	$1,134,654
Water	$801,346	$90,000	$711,346
Major Collector Rd.	$1,165,778	$1,195,000	($29,222)
Total			**$2,526,464**

(1) Note: It is recognized that the City of Surrey collects DCC's on a community basis not on a NCP or area basis. Also of note is that DCC funds collected for one service cannot be applied to fund another type of service. This table is presented only to show the financial impact of the NCP on the current 10 Year Plan. The table also shows the magnitude of additional works or refined construction costs required to service the NCP area as compared to the 2001-2010, 10-Year Servicing Plan.

The unit DCC rates used for each service is shown in Appendix D.

It is assumed that the need for arterial roads is principally driven by the larger community needs and therefore those costs have not been included in the table. The projected DCC revenue for arterial roads is $4,617,084.

As shown in **Table 4.2** the funds necessary for the collector road DCC works is marginally less than the projected DCC revenue for the NCP area. This assumes that one half of collector road costs for 128th Street and 132nd Street traffic circles are allocated to this NCP. The signals costs are allocated to the arterial road program. This results in a collector road DCC deficit of $29,222 if the non-arterial roads DCCs are applied to fund the additional road needs. Part of the eastern area of the NCP area has already been developed and contributed DCC to the City.

If the additional items shown in **Tables 4.1a – 4.1c** are added to the DCC program and the DCCs collected in the area are applied to the additional works all the services except the non arterial roads program show a significant positive balance.

Much of the required infrastructure will help support a broader community need but nevertheless a component of that infrastructure is required solely for the NCP Plan Area. We recommend adding the engineering infrastructure to the DCC program in the next 10-year capital plan review and adjusting the DCCs accordingly.

City of Surrey

West Newton/ Highway 10

Neighbourhood Concept Plan Engineering Servicing Plan

APPENDIX A

WEST NEWTON / HIGHWAY #10 LOCAL AREA PLAN BUILD-OUT ESTIMATE

City of Surrey

West Newton / Highway 10

Neighbourhood Concept Plan Engineering Servicing Plan

West Newton / Highway #10 - Local Area Plan Build-out Estimates

Proposed New Development

(At Maximum Allowable Density)

Residential Uses	Land Area (Acres)	Density (upa)	Dwelling Units	Population	Business Floor Area (ft^2)
Single Detached 6 upa	33	6	200	660	
Single Detached Small Lot 10 upa	22	10	220	700	
Single Detached Cluster 10 upa	3	10	30	100	
Single Detached Small Lot with Lane 13 upa	24	13	310	990	
Attached Housing 20 upa	8	20	150	390	
Seniors' Housing 20 upa	2	20	40	40	
Total Residential	**91**		**950**	**2,880**	
Other Uses		(FAR)			
Local Commercial	2	0.5			52,000
Institutional	1				
Park	16				
Buffer	8				
Detention Pond	0				
Other Uses Total	**28**				**52,000**

Existing / Retained Development within Plan Area

Urban Single Detached	63		340	1,260	
Suburban Single Detached	33		96	360	
Suburban Single Detached Transition	8				
Commercial	1				9,000
Park	4				
School	5				
Church	5				
Fire Hall	4				
ROW Greenway	11				
Existing Development Total	**133**		**436**	**1,620**	**9,000**

Local Area Plan Totals	**252**		**1,386**	**4,500**	**61,000**

Total Land Area Excludes Roads

City of Surrey

West Newton/ Highway 10

Neighbourhood Concept Plan Engineering Servicing Plan

APPENDIX B

WEST NEWTON / HIGHWAY #10 NCP SANITARY SEWER DESIGN SUMMARY

West Newton/Highway #10 NCP - Sanitary Sewer Design Summary

Area Serviced	U/S Area			Tributary Population	Average Daily Dry Weather Flow	Harman Peaking Factor	Peak Dry Weather Flow	Infiltration Rate	Peak Wet Weather Flow	Slope of Sewer	Required Pipe Diameter	Pipe Capacity (flowing 50% full)	Proposed Pipe Diameter	Flow Velocity at PDWF	Sufficient Capacity (yes/no)?	Velocity Exceeds 0.6 m/s at PDWF (yes/no)?	Comments	Numerical Check of Velocity Achieved in Sewer			
	From Node	To Node	Contributing Area															Estimate h (by trial)	Calculated Angle	Calculated Flow (to match values from row J)	Calculated Velocity
A	C	D	F	G	H (G x 350 l/day/person)	I	J (H x I)	K (F x 0.13 l/s/ha)	L (J + K)	M	N	O	P	R	S	T	U				
(-)	(-)	(-)	(ha)	(persons)	(l/s)	(-)	(l/s)	(l/s)	(l/s)	(m/m)	(mm)	(l/s)	(mm)	(m/s)	(-)	(-)	(-)	(m)	(degrees)	(-)	(m/s)
East and west of 125 St. between 59 and 60 Ave.	1	2	4	358	1.45	4.04	5.87	0.52	6.39	0.03	96	6.50	200	1.17	yes	yes	Select minimum sewer size for residential lands.	0.0870	111.20	5.89	1.17
East and west of 125 St. between Highway #10 and 60 Ave.	2	38	7.4	510	2.07	3.97	8.20	0.96	9.16	0.024	114	9.18	200	1.19	yes	yes	Select minimum sewer size for residential lands.	0.1087	125.68	8.21	1.19
East and west of 126 St. between 59 and 60 Ave.	3	4	3.6	36	0.15	4.34	0.63	0.47	1.10	0.042	47	1.15	200	0.68	yes	yes	Select minimum sewer size for residential lands.	0.0275	60.80	0.64	0.68
East and west of 126 St. between Highway #10 and 60 Ave.	4	37	4.8	100	0.41	4.24	1.72	0.62	2.34	0.0375	63	2.37	200	0.88	yes	yes	Select minimum sewer size for residential lands.	0.0454	78.75	1.73	0.88
Area NE of 126 St. and 60 Ave. Intesection	5	6	1.3	60	0.24	4.30	1.04	0.17	1.21	0.033	51	1.27	200	0.72	yes	yes	Select minimum sewer size for residential lands.	0.0368	70.63	1.04	0.72
West of 128 St. between 59 Ave. and 61 Ave.	7	8	3.3	125	0.51	4.22	2.13	0.43	2.56	0.039	65	2.62	200	0.95	yes	yes	Select minimum sewer size for residential lands.	0.0500	82.82	2.16	0.95
West of 128 St. between 59 Ave. and 61 Ave.	8	10	3.6	133	0.54	4.21	2.27	0.47	2.73	0.011	84	2.76	200	0.62	yes	yes	Select minimum sewer size for residential lands.	0.0697	98.69	2.28	0.62
North of 60 Ave. around 129A St.	11	12	1.6	78	0.32	4.27	1.35	0.21	1.56	0.0125	67	1.61	200	0.56	yes	no	Existing sanitary sewer size.	0.0525	84.96	1.35	0.56
North of 60 Ave. between 128 St. and 130B St.	12	13	3.1	142	0.58	4.20	2.42	0.40	2.82	0.005	99	2.88	200	0.48	yes	no	Existing sanitary sewer size.	0.0873	111.39	2.42	0.48
Along 60 Ave. between 127B St. and 128A St.	13	9	4.1	192	0.78	4.15	3.23	0.53	3.76	0.005	110	3.81	200	0.52	yes	no	Existing sanitary sewer size.	0.1008	120.55	3.23	0.52
East and west of 128 St., between 59 Ave. and 61 Ave.	9	10	6.9	364	1.47	4.04	5.96	0.90	6.86	0.0243	102	6.87	200	1.09	yes	yes	Existing sanitary sewer size.	0.0922	114.78	5.96	1.09
East and west of 128 St., between 59 Ave. and Hwy #10.	10	33	14.4	592	2.40	3.94	9.44	1.87	11.31	0.041	112	11.44	300	1.43	yes	yes	Existing sanitary sewer size.	0.0896	90.95	9.44	1.43
North of 59 Ave. between 128 St. and 129 St.	14	21	2	206	0.83	4.14	3.46	0.26	3.72	0.005	110	3.81	200	0.53	yes	no	Select minimum sewer size for residential lands.	0.1040	122.63	3.43	0.53
East and west of 129 St. between 59 Ave. 60 Ave.	15	21	3.7	95	0.38	4.25	1.64	0.48	2.12	0.028	64	2.13	200	0.78	yes	yes	Select minimum sewer size for residential lands.	0.0475	80.60	1.64	0.78
East and west of 131A St. between 59 Ave. 60 Ave.	17	18	1.8	67	0.27	4.29	1.16	0.23	1.40	0.033	53	1.40	200	0.75	yes	yes	Select minimum sewer size for residential lands.	0.0387	72.49	1.16	0.75
East and west of 131 St. between 59 Ave. 60 Ave.	16	19	1.8	89	0.36	4.26	1.53	0.23	1.77	0.027	61	1.84	200	0.75	yes	yes	Select minimum sewer size for residential lands.	0.0463	79.56	1.53	0.75
Between 130B St., 131A St., 59 Ave. and 60 Ave.	18	19	2.1	97	0.39	4.25	1.67	0.27	1.94	0.005	86	1.98	200	0.43	yes	no	Select minimum sewer size for residential lands.	0.0726	100.86	1.67	0.43
East of 130 St., between 59 Ave. and 60 Ave.	19	20	8.1	250	1.01	4.11	4.16	1.05	5.22	0.005	124	5.24	200	0.56	yes	no	Select minimum sewer size for residential lands.	0.1147	129.51	4.16	0.56
East of 129 St., between 59 Ave. and 60 Ave.	20	21	13.1	385	1.56	4.03	6.29	1.70	7.99	0.015	119	8.13	200	0.93	yes	yes	Select minimum sewer size for residential lands.	0.1070	124.58	6.29	0.93
North of 59 Ave. between 128A St. and 131A St.	21	22	20	742	3.01	3.88	11.66	2.60	14.26	0.046	120	14.56	200	1.66	yes	yes	Select minimum sewer size for residential lands.	0.1102	126.61	11.66	1.66
North of 58A Ave. between 128A St. and 131A St.	22	32	22.4	803	3.25	3.86	12.55	2.91	15.47	0.035	130	15.72	200	1.53	yes	yes	Select minimum sewer size for residential lands.	0.1227	134.54	12.55	1.53
West and east of 132 St. between 59 Ave. and 60 Ave.	23	24	2.3	36	0.15	4.34	0.63	0.30	0.93	0.021	50	0.96	200	0.53	yes	no	Select minimum sewer size for residential lands.	0.0322	65.93	0.63	0.53
West and east of 132 St. between 59 Ave. Hwy #10.	24	28	4.4	73	0.30	4.28	1.27	0.57	1.84	0.03	60	1.86	200	0.74	yes	yes	Select minimum sewer size for residential lands.	0.0413	74.97	1.27	0.74
North and south of 58B Ave. between 133B St. and 135 St.	25	26	1.8	45	0.18	4.32	0.79	0.23	1.02	0.006	65	1.03	200	0.37	yes	no	Select minimum sewer size for residential lands.	0.0485	81.51	0.79	0.37
North of Hwy #10, between 132 St. and 132A St.	27	28	2.4	85	0.34	4.26	1.47	0.31	1.78	0.01	73	1.81	200	0.53	yes	no	Select minimum sewer size for residential lands.	0.0576	89.20	1.47	0.53
North of Hwy #10, between 131 St. and 132 St.	28	31	7.7	232	0.94	4.12	3.88	1.00	4.88	0.023	91	4.93	200	0.94	yes	yes	Select minimum sewer size for residential lands.	0.0756	103.08	3.88	0.94
West and east of 131 St. between 59 Ave. and Hwy #10.	29	30	2.5	26	0.11	4.36	0.46	0.33	0.78	0.036	42	0.79	200	0.58	yes	no	Select minimum sewer size for residential lands.	0.0245	57.32	0.46	0.58
Between 59 Ave. and Hwy #10, and between 130 and 132 Sts.	30	31	5.6	125	0.51	4.22	2.13	0.73	2.86	0.039	68	2.96	200	0.95	yes	yes	Select minimum sewer size for residential lands.	0.0498	82.65	2.14	0.95
U/S of 129 St. and Hwy #10 intersection.	31	32	15.8	374	1.52	4.04	6.11	2.05	8.17	0.013	123	8.27	200	0.88	yes	yes	Select minimum sewer size for residential lands.	0.1100	126.51	6.18	0.88
U/S of 128 St. and Hwy #10 intersection.	32	33	39.2	1192	4.83	3.75	18.11	5.10	23.20	0.005	217	23.21	250	0.82	yes	yes	N/A	0.2293	170.51	18.11	0.82
U/S of 126A St. and Hwy #10 intersection.	33	35	56	1734	7.02	3.63	25.52	7.28	32.80	0.005	248	33.11	300	0.90	yes	yes	Existing sanitary sewer size.	0.2539	162.32	25.52	0.90
West and east of 128 St. between 59 Ave. and Hwy #10.	34	35	4.5	51	0.21	4.31	0.89	0.59	1.48	0.022	59	1.52	200	0.60	yes	yes	Existing sanitary sewer size.	0.0375	71.32	0.89	0.60
U/S of 126 St. and Hwy #10 intersection.	35	36	60.7	1838	7.45	3.61	26.91	7.89	34.80	0.005	253	34.91	300	0.91	yes	yes	Existing sanitary sewer size.	0.2615	165.25	26.91	0.91
U/S of 126 St. and Hwy #10 intersection.	36	37	61.1	1847	7.48	3.61	27.03	7.94	34.97	0.011	219	35.28	300	1.21	yes	yes	Maintain existing/future sanitary trunk diameter.	0.2115	145.68	27.03	1.21
U/S of 125 St. and Hwy #10 intersection.	37	38	68.9	2019	8.18	3.58	29.30	8.96	38.26	0.011	226	38.36	300	1.24	yes	yes	Maintain existing/future sanitary trunk diameter.	0.2208	149.38	29.30	1.24
U/S of 124 St. and Hwy #10 intersection.	38	39	75.9	2025	8.20	3.58	29.38	9.87	39.25	0.011	228	39.27	300	1.24	yes	yes	Maintain existing/future sanitary trunk diameter.	0.2212	149.54	29.40	1.24
Check Capacity of Receiving Trunk Sections D/S of Node 39	39	40	81	2142	8.68	3.56	30.91	10.53	41.44	0.005	270	41.51	375	0.93	yes	yes	Existing sanitary sewer size.	0.2552	142.74	30.91	0.93
	40	41	82.8	2199	8.91	3.55	31.65	10.76	42.42	0.005	273	42.75	375	0.94	yes	yes	Existing sanitary sewer size.	0.2584	143.78	31.65	0.94
	41	42	85.5	2292	9.28	3.54	32.86	11.12	43.97	0.0204	212	44.06	375	1.57	yes	yes	Existing sanitary sewer size.	0.1835	118.58	32.86	1.57
	42	43	87	2316	9.38	3.54	33.17	11.31	44.48	0.0155	225	45.00	375	1.43	yes	yes	Existing sanitary sewer size.	0.1976	123.54	33.17	1.43
	43	44	88.1	2328	9.43	3.53	33.32	11.45	44.78	0.0376	191	45.33	375	1.96	yes	yes	Existing sanitary sewer size.	0.1586	109.51	33.32	1.96
	44	45	89.4	2340	9.48	3.53	33.48	11.62	45.10	0.0215	212	45.24	375	1.61	yes	yes	Existing sanitary sewer size.	0.1828	118.33	33.48	1.61
	45	46	92.6	2382	9.65	3.53	34.02	12.04	46.06	0.044	187	46.35	375	2.08	yes	yes	Existing sanitary sewer size.	0.1541	107.83	34.02	2.08
	46	47	103.8	2550	10.33	3.50	36.17	13.49	49.66	0.025	214	50.01	375	1.73	yes	yes	Existing sanitary sewer size.	0.1830	118.39	36.17	1.73

City of Surrey

West Newton/ Highway 10

Neighbourhood Concept Plan Engineering Servicing Plan

APPENDIX C

WATER MODEL ANALYSIS

Scenario: Option "D" Max Day
Fire Flow Analysis
Junction Report

Label	Elevation (m)	Type	Demand (Calculated) (l/s)	Calculated Hydraulic Grade (m)	Pressure (m H2O)	Needed Fire Flow (l/s)	Available Fire Flow (l/s)	Satisfies Fire Flow Constraints?
2	74.00	Demand	2.40	132.59	58.475	90.00	266.95	true
3	74.50	Demand	0.91	132.66	58.044	90.00	283.09	true
4	77.50	Demand	0.00	132.83	55.214	90.00	322.60	true
5	79.00	Demand	0.95	132.81	53.705	90.00	265.72	true
6	80.50	Demand	0.83	132.81	52.202	90.00	225.61	true
7	83.00	Demand	0.21	132.80	49.703	90.00	198.61	true
8	86.50	Demand	1.92	132.80	46.209	90.00	180.65	true
9	93.50	Demand	1.16	132.80	39.219	90.00	127.32	true
10	90.00	Demand	1.47	132.80	42.712	90.00	132.61	true
11	86.30	Demand	0.92	132.80	46.409	90.00	157.22	true
12	73.80	Demand	0.00	132.59	58.673	90.00	131.46	true
13	73.60	Demand	0.00	132.59	58.872	90.00	123.60	true
14	71.80	Demand	0.64	132.59	60.668	90.00	112.35	true
15	79.03	Demand	0.00	132.94	53.797	90.00	354.86	true
16	75.87	Demand	1.19	132.93	56.947	90.00	350.60	true
17	72.70	Demand	0.48	132.93	60.109	90.00	354.06	true
18	71.78	Demand	0.00	132.93	61.024	90.00	349.90	true
19	73.03	Demand	0.00	133.13	59.976	90.00	327.24	true
20	74.00	Demand	0.50	132.95	58.831	90.00	269.20	true
21	78.02	Demand	0.50	133.01	54.881	90.00	146.45	true
22	82.04	Demand	0.34	133.10	50.960	90.00	366.62	true
23	85.04	Demand	1.26	133.27	48.137	120.00	384.71	true
24	77.87	Demand	2.49	133.37	55.392	120.00	339.95	true
25	74.28	Demand	0.07	133.37	58.975	90.00	402.03	true
26	76.78	Demand	0.00	133.56	56.663	90.00	500.00	true
27	80.94	Demand	2.87	133.55	52.508	90.00	443.34	true
28	89.25	Demand	0.80	133.60	44.259	90.00	460.61	true
29	94.20	Demand	2.25	133.93	39.655	90.00	448.90	true
30	99.15	Demand	1.51	134.27	35.048	90.00	476.58	true
31	100.25	Demand	0.64	134.50	34.184	90.00	500.00	true
32	103.50	Demand	0.00	135.00	31.435	90.00	500.00	true
33	101.10	Demand	1.03	134.23	33.063	90.00	161.64	true
34	101.75	Demand	1.13	134.22	32.407	90.00	146.24	true
35	102.00	Demand	1.55	134.21	32.141	90.00	130.15	true
36	96.00	Demand	0.83	134.20	38.127	90.00	175.80	true
37	93.01	Demand	0.00	134.10	41.005	90.00	500.00	true
38	92.11	Demand	1.86	133.85	41.654	90.00	265.66	true
39	91.20	Demand	1.30	133.67	42.380	90.00	321.28	true
40	83.85	Demand	0.95	133.66	49.709	90.00	253.92	true
41	76.50	Demand	0.00	133.66	57.043	90.00	500.00	true
42	77.82	Demand	0.48	133.78	55.845	90.00	500.00	true
43	79.13	Demand	0.61	133.90	54.658	90.00	500.00	true
44	86.07	Demand	2.98	133.95	47.779	120.00	500.00	true
45	87.00	Demand	3.27	133.82	46.727	120.00	458.37	true
46	89.00	Demand	2.47	133.74	44.648	120.00	284.00	true
47	91.00	Demand	2.88	133.68	42.599	90.00	312.82	true
48	92.00	Demand	0.58	133.67	41.581	90.00	260.38	true
49	95.00	Demand	0.26	133.64	38.559	90.00	500.00	true
50	94.53	Demand	0.97	133.69	39.084	90.00	500.00	true
51	92.73	Demand	2.06	133.84	41.026	90.00	500.00	true
52	92.28	Demand	1.91	133.89	41.528	120.00	500.00	true

Scenario: Option "D" Max Day
Fire Flow Analysis
Junction Report

Label	Elevation (m)	Type	Demand (Calculated) (l/s)	Calculated Hydraulic Grade (m)	Pressure (m H2O)	Needed Fire Flow (l/s)	Available Fire Flow (l/s)	Satisfies Fire Flow Constraints?
53	93.01	Demand	0.10	134.13	41.034	90.00	500.00	true
54	99.67	Demand	0.56	134.67	34.932	90.00	500.00	true
55	103.50	Demand	0.00	134.92	31.352	90.00	500.00	true
56	79.13	Demand	0.64	133.90	54.663	120.00	500.00	true
57	81.15	Demand	0.36	133.83	52.574	90.00	500.00	true
58	83.17	Demand	1.14	133.77	50.499	90.00	500.00	true
59	85.18	Demand	0.98	133.70	48.420	90.00	500.00	true
60	87.20	Demand	0.97	133.65	46.355	90.00	500.00	true
61	91.43	Demand	0.59	133.62	42.103	90.00	500.00	true
62	95.66	Demand	0.40	133.59	37.856	90.00	500.00	true
63	95.07	Demand	0.00	133.58	38.433	90.00	500.00	true
64	96.20	Demand	0.00	133.55	37.276	90.00	500.00	true
65	98.50	Demand	1.68	134.30	35.730	90.00	125.03	true
66	98.36	Demand	0.58	134.47	36.042	90.00	500.00	true
66a	98.36	Demand	0.00	134.51	36.074	90.00	500.00	true
67	97.25	Demand	1.53	134.02	36.694	90.00	153.91	true
68	96.25	Demand	0.00	133.83	37.505	90.00	137.43	true
69	95.50	Demand	2.41	133.76	38.182	90.00	117.99	true
70	96.50	Demand	1.24	133.72	37.143	90.00	103.31	true
71	96.50	Demand	0.87	133.41	36.831	90.00	115.86	true
72	96.75	Demand	1.26	133.52	36.692	90.00	90.50	true
73	95.00	Demand	1.75	133.29	38.213	90.00	124.05	true
74	92.50	Demand	0.58	133.09	40.511	90.00	356.86	true
75	94.35	Demand	1.80	133.31	38.878	90.00	416.14	true
76	88.50	Demand	48.82	132.86	44.267	90.00	323.28	true
77	94.00	Demand	1.00	133.11	39.032	90.00	238.90	true
78	93.10	Demand	2.30	133.19	40.014	90.00	281.06	true
79	92.20	Demand	0.89	133.30	41.017	90.00	420.45	true
80	93.30	Demand	0.00	133.33	39.947	90.00	375.85	true
81	93.87	Demand	1.00	133.34	39.393	90.00	366.22	true
82	95.55	Demand	0.00	133.41	37.780	90.00	403.23	true
83	96.25	Demand	0.61	133.38	37.051	90.00	257.16	true
84	96.75	Demand	0.56	133.37	36.547	90.00	180.84	true
85	95.50	Demand	0.66	133.37	37.792	90.00	150.13	true
86	94.50	Demand	0.75	133.37	38.787	90.00	151.08	true
87	94.50	Demand	0.75	133.37	38.787	90.00	147.84	true
88	93.70	Demand	0.30	133.37	39.586	90.00	185.02	true
89	94.50	Demand	0.51	133.33	38.750	90.00	187.41	true
90	93.00	Demand	1.25	133.32	40.240	90.00	275.51	true
91	90.30	Demand	0.11	133.30	42.918	90.00	474.63	true
92	87.80	Demand	0.90	133.30	45.413	90.00	500.00	true
93	92.00	Demand	0.62	133.36	41.273	90.00	271.45	true
94	90.00	Demand	0.82	133.47	43.381	120.00	463.35	true
95	93.30	Demand	0.69	133.39	40.013	90.00	167.56	true
96	85.28	Demand	0.00	133.29	47.909	90.00	500.00	true
97	86.23	Demand	0.00	133.30	46.971	90.00	500.00	true
98	91.00	Demand	0.28	133.39	42.306	90.00	474.55	true
99	88.90	Demand	0.00	133.57	44.582	120.00	500.00	true
100	88.90	Demand	0.21	133.57	44.582	90.00	500.00	true
101	87.54	Demand	0.38	133.60	45.965	90.00	90.55	true
102	86.17	Demand	0.22	133.65	47.381	90.00	500.00	true

Scenario: Option "D" Max Day
Fire Flow Analysis
Junction Report

Label	Elevation (m)	Type	Demand (Calculated) (l/s)	Calculated Hydraulic Grade (m)	Pressure (m H2O)	Needed Fire Flow (l/s)	Available Fire Flow (l/s)	Satisfies Fire Flow Constraints?
103	87.63	Demand	0.00	133.63	45.906	90.00	500.00	true
104	88.05	Demand	0.00	133.61	45.468	90.00	500.00	true
105	88.48	Demand	0.00	133.59	45.019	90.00	500.00	true
106	71.50	Demand	0.45	132.92	61.292	90.00	38.60	false
107	89.04	Demand	0.00	132.94	43.807	90.00	15.40	false
150	82.00	Demand	2.59	133.74	51.639	90.00	195.80	true
151	81.00	Demand	0.00	133.82	52.714	90.00	450.08	true
B-1	71.00	Demand	16.57	132.84	61.715	90.00	266.99	true
B-2	71.78	Demand	3.88	132.92	61.018	90.00	272.58	true
B-3	73.50	Demand	28.94	132.52	58.902	90.00	249.94	true
B-4	79.00	Demand	5.20	133.85	54.744	90.00	190.73	true
B-5	79.00	Demand	2.16	133.87	54.757	90.00	90.89	true
B-6	86.00	Demand	7.26	133.64	47.545	90.00	500.00	true
B-7	88.50	Demand	3.17	133.57	44.979	90.00	400.38	true
B-8	85.28	Demand	0.40	133.29	47.909	90.00	386.81	true
B-9	85.00	Demand	78.26	133.22	48.127	90.00	500.00	true
B-10	92.00	Demand	5.96	133.09	41.005	90.00	293.97	true
J-152	0.00	Demand	0.00	133.48	133.209	90.00	500.00	true

Scenario: Option "D" Max Day
Fire Flow Analysis
Pipe Report

Label	Length (m)	Diameter (mm)	Material	Discharge (l/s)	Velocity (m/s)	Pressure Pipe Headloss (m)	From Node	To Node
P-281	135.94	250.0	Cast iron	-17.11	0.35	0.09	98	J-152
P-282	67.36	250.0	Cast iron	-26.11	0.53	0.09	J-152	99
P-283	121.01	300.0	Ductile Iron	-9.00	0.13	0.01	94	J-152
P1	103.63	300.0	PVC	28.94	0.41	0.07	2	B-3
P2	81.99	300.0	Ductile Iron	31.99	0.45	0.07	3	2
P3	186.23	300.0	PVC	32.90	0.47	0.16	4	3
P4	86.56	250.0	PVC	7.44	0.15	0.01	4	5
P5	124.36	250.0	PVC	4.26	0.09	0.01	5	6
P6	122.53	250.0	PVC	3.43	0.07	0.00	6	7
P7	131.06	300.0	PVC	3.23	0.05	0.00	7	8
P8	162.46	200.0	PVC	1.31	0.04	0.00	8	9
P9	197.51	200.0	PVC	0.15	0.00	0.00	9	10
P10	193.24	200.0	PVC	-1.32	0.04	0.00	10	11
P11	165.81	200.0	PVC	-2.24	0.07	0.01	11	5
P12	56.08	150.0	PVC	0.64	0.04	0.00	2	12
P13	40.23	200.0	PVC	0.64	0.02	0.00	12	13
P14	88.70	200.0	PVC	0.64	0.02	0.00	13	14
P15	85.34	300.0	Ductile Iron	40.35	0.57	0.11	15	4
P15a	402.34	100.0	Cast iron	0.00	0.00	0.00	15	107
P16	172.82	300.0	Ductile Iron	4.16	0.06	0.00	15	16
P17	166.12	300.0	Ductile Iron	2.97	0.04	0.00	16	17
P18	63.09	300.0	Ductile Iron	7.39	0.10	0.00	17	18
P19	108.20	200.0	Cast iron	13.51	0.43	0.20	19	18
P20	63.70	100.0	Cast iron	-2.72	0.35	0.18	20	19
P20a	108.81	200.0	Ductile Iron	4.91	0.16	0.02	20	17
P21	165.81	150.0	Ductile Iron	2.69	0.15	0.06	21	20
P22	174.96	150.0	Ductile Iron	3.19	0.18	0.09	22	21
P22a	108.51	300.0	Asbestos Cemen	44.51	0.63	0.17	22	15
P23	96.32	300.0	Asbestos Cemen	48.04	0.68	0.17	23	22
P24	261.82	200.0	PVC	-5.77	0.18	0.10	23	24
P24a	218.24	200.0	Ductile Iron	-8.73	0.28	0.18	24	27
P25	138.99	200.0	PVC	0.47	0.02	0.00	24	25
P25a	95.10	200.0	Cast iron	16.23	0.52	0.25	25	19
P26	220.37	250.0	Cast iron	15.83	0.32	0.18	26	25
P26a	84.43	250.0	Cast iron	-19.11	0.39	0.10	26	41
P27	136.86	250.0	Ductile Iron	-3.28	0.07	0.00	27	26
P28	263.96	250.0	Ductile Iron	8.32	0.17	0.04	28	27
P28a	218.85	300.0	Asbestos Cemen	43.53	0.62	0.32	28	23
P29	215.49	300.0	Asbestos Cemen	44.80	0.63	0.34	29	28
P30	195.38	300.0	Asbestos Cemen	47.04	0.67	0.33	30	29
P31	109.73	300.0	Asbestos Cemen	53.04	0.75	0.23	31	30
P32	227.08	300.0	Asbestos Cemen	53.68	0.76	0.50	32	31
P33	160.63	200.0	PVC	4.49	0.14	0.04	30	33
P34	53.64	200.0	Ductile Iron	3.46	0.11	0.01	33	34
P35	229.21	200.0	PVC	2.34	0.07	0.02	34	35
P36	217.63	200.0	PVC	0.79	0.03	0.00	35	36
P37	151.49	150.0	Cast iron	-3.75	0.21	0.11	37	36
P37a	410.00	450.0	Ductile Iron	-73.74	0.46	0.22	56	53
P38	153.01	200.0	PVC	12.62	0.40	0.25	37	38
P39	150.57	200.0	PVC	10.76	0.34	0.18	38	39
P39a	100.28	200.0	PVC	-7.85	0.25	0.07	28	39

Scenario: Option "D" Max Day
Fire Flow Analysis
Pipe Report

Label	Length (m)	Diameter (mm)	Material	Discharge (l/s)	Velocity (m/s)	Pressure Pipe Headloss (m)	From Node	To Node
P40	188.06	200.0	PVC	1.60	0.05	0.01	39	40
P41	215.19	200.0	PVC	0.64	0.02	0.00	40	41
P42	163.37	250.0	Cast iron	18.46	0.38	0.12	42	41
P43	156.36	250.0	Cast iron	18.95	0.39	0.12	43	42
P44	219.46	250.0	Ductile Iron	9.43	0.19	0.05	44	43
P44a	186.84	250.0	Ductile Iron	19.54	0.40	0.15	37	44
P45	218.54	200.0	Ductile Iron	7.13	0.23	0.12	44	45
P45a	188.37	200.0	Ductile Iron	2.71	0.09	0.02	51	45
P46	202.08	200.0	Ductile Iron	6.03	0.19	0.08	45	46
P47	209.70	200.0	Ductile Iron	4.62	0.15	0.05	46	47
P48	97.23	200.0	Ductile Iron	4.06	0.13	0.02	47	48
P49	188.06	200.0	Ductile Iron	3.48	0.11	0.03	48	49
P50	149.05	300.0	Ductile Iron	20.68	0.29	0.06	50	49
P51	361.19	300.0	Ductile Iron	21.64	0.31	0.15	51	50
P52	90.53	300.0	Ductile Iron	26.40	0.37	0.05	52	51
P52a	126.49	250.0	Ductile Iron	28.32	0.58	0.21	37	52
P53	35.97	300.0	Ductile Iron	31.60	0.45	0.03	53	37
P53a	18.29	250.0	Ductile Iron	28.19	0.57	0.03	53	37
P54	93.88	600.0	Steel	237.06	0.84	0.17	54	66a
P54a	387.10	600.0	Steel	215.83	0.76	0.38	66a	53
P55	206.65	600.0	Steel	237.61	0.84	0.24	55	54
P56	9.45	250.0	Cast iron	-15.32	0.31	0.00	43	56
P56a	404.16	150.0	Cast iron	3.06	0.17	0.19	37	56
P57	205.74	450.0	Ductile Iron	58.68	0.37	0.07	56	57
P57a	75.59	200.0	Ductile Iron	3.11	0.10	0.01	57	151
P58	199.34	450.0	Ductile Iron	55.21	0.35	0.06	57	58
P59	216.10	450.0	Ductile Iron	54.08	0.34	0.07	58	59
P60	188.06	450.0	Ductile Iron	50.77	0.32	0.05	59	60
P60a	216.10	200.0	Ductile Iron	-2.32	0.07	0.02	47	59
P61	210.01	300.0	Cast iron	-12.46	0.18	0.03	61	60
P62	193.55	300.0	Cast iron	-11.87	0.17	0.03	62	61
P62a	92.05	300.0	Ductile Iron	23.89	0.34	0.04	49	62
P63	11.28	300.0	Ductile Iron	-35.36	0.50	0.01	63	62
P63a	819.30	450.0	Concrete	82.19	0.52	0.55	53	63
P64	11.58	300.0	Ductile Iron	-58.55	0.83	0.03	64	63
P65	138.38	150.0	Cast iron	-3.80	0.21	0.10	36	65
P66	122.22	150.0	Cast iron	-5.47	0.31	0.17	65	66
P67	199.03	200.0	Ductile Iron	15.18	0.48	0.46	66	67
P68	99.36	200.0	Ductile Iron	13.65	0.43	0.19	67	68
P69	101.19	200.0	Ductile Iron	8.08	0.26	0.07	68	69
P70	109.42	200.0	Ductile Iron	5.67	0.18	0.04	69	70
P71	328.88	150.0	Ductile Iron	4.43	0.25	0.31	70	71
P71a	498.65	200.0	Ductile Iron	4.31	0.14	0.11	72	71
P72	216.10	150.0	PVC	5.57	0.32	0.31	68	72
P73	169.47	200.0	Ductile Iron	7.87	0.25	0.12	71	73
P74	114.00	150.0	Ductile Iron	6.12	0.35	0.20	73	74
P75	185.32	300.0	Cast iron	-38.05	0.54	0.21	74	75
P75a	194.16	300.0	Cast iron	-39.85	0.56	0.24	75	64
P76	208.79	300.0	PVC	37.63	0.53	0.24	74	76
P77	195.07	200.0	PVC	-11.19	0.36	0.25	76	77
P78	244.14	250.0	PVC	-12.19	0.25	0.08	77	78

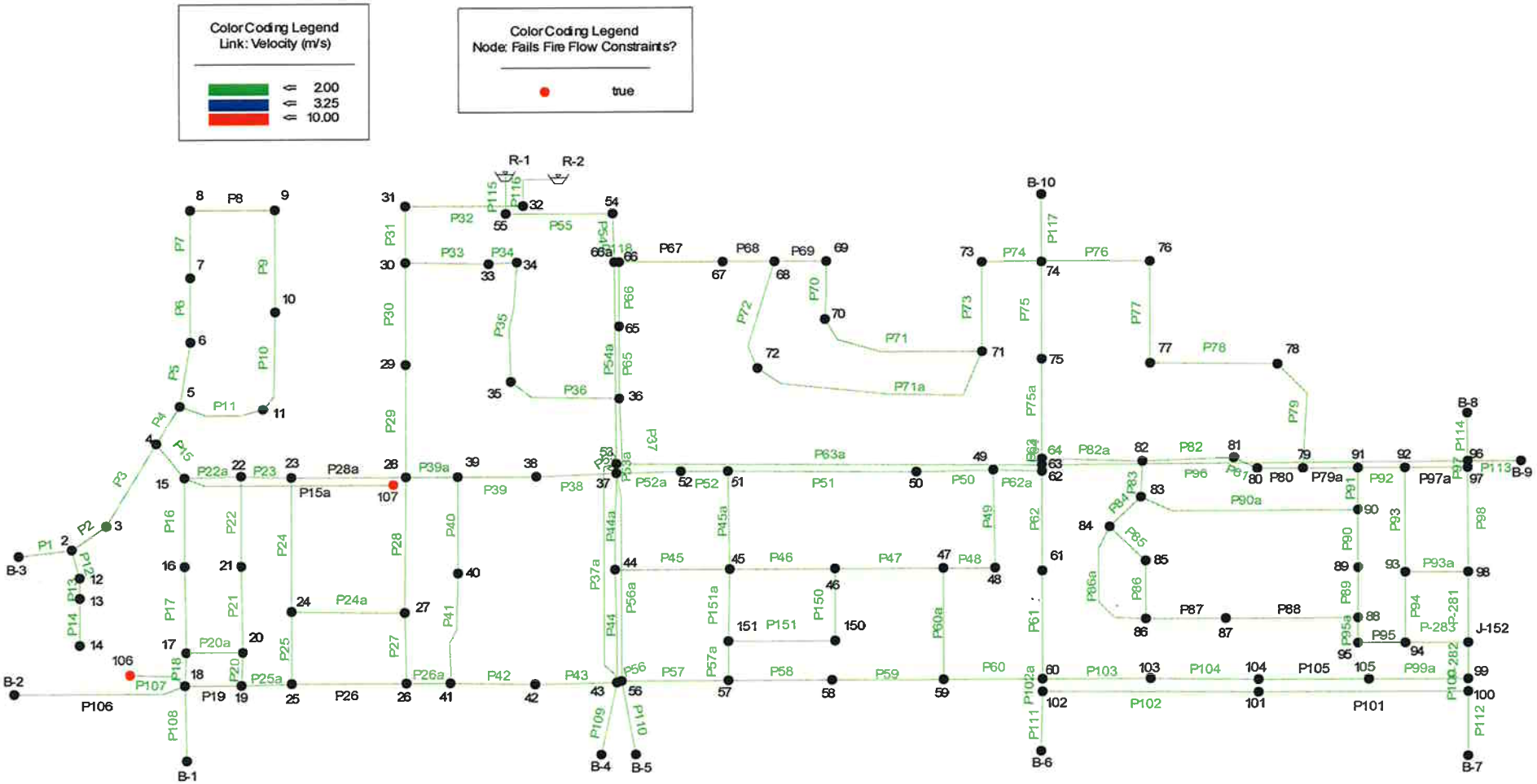
Scenario: Option "D" Max Day
Fire Flow Analysis
Pipe Report

Label	Length (m)	Diameter (mm)	Material	Discharge (l/s)	Velocity (m/s)	Pressure Pipe Headloss (m)	From Node	To Node
P79	225.55	250.0	PVC	-14.49	0.30	0.11	78	79
P79a	103.63	250.0	PVC	-3.83	0.08	0.00	79	91
P80	88.39	250.0	PVC	11.55	0.24	0.03	80	79
P81	50.29	250.0	PVC	11.55	0.24	0.02	81	80
P82	175.87	250.0	Ductile Iron	12.54	0.26	0.06	82	81
P82a	192.63	250.0	Ductile Iron	18.69	0.38	0.14	64	82
P83	69.49	200.0	Ductile Iron	6.15	0.20	0.03	82	83
P84	83.52	200.0	PVC	2.32	0.07	0.01	83	84
P85	95.10	200.0	PVC	1.24	0.04	0.00	84	85
P86	114.00	150.0	PVC	0.58	0.03	0.00	85	86
P86a	253.29	150.0	PVC	0.52	0.03	0.00	84	86
P87	154.23	200.0	PVC	0.36	0.01	0.00	86	87
P88	251.16	200.0	Ductile Iron	-0.38	0.01	0.00	87	88
P89	98.15	150.0	Ductile Iron	-2.71	0.15	0.04	89	88
P90	109.42	200.0	PVC	-2.20	0.07	0.01	90	89
P90a	422.15	200.0	Ductile Iron	3.22	0.10	0.05	83	90
P91	81.99	200.0	Ductile Iron	-4.17	0.13	0.02	91	90
P92	91.44	250.0	Cast iron	0.23	0.00	0.00	91	92
P93	202.08	200.0	PVC	5.82	0.19	0.05	93	92
P93a	121.01	150.0	Asbestos Cemen	2.33	0.13	0.03	98	93
P94	136.25	150.0	Asbestos Cemen	4.11	0.23	0.11	94	93
P95	91.44	150.0	Ductile Iron	-4.08	0.23	0.07	95	94
P95a	48.77	150.0	Asbestos Cemen	-3.39	0.19	0.03	88	95
P96	818.39	450.0	Concrete	59.01	0.37	0.30	63	96
P97	12.80	250.0	Ductile Iron	-19.66	0.40	0.01	96	97
P97a	121.01	250.0	Cast iron	5.15	0.11	0.01	92	97
P98	202.69	250.0	Cast iron	-14.50	0.30	0.10	97	98
P99a	190.50	450.0	Ductile Iron	28.45	0.18	0.02	105	99
P100	24.08	250.0	Ductile Iron	2.33	0.05	0.00	99	100
P101	402.03	150.0	Ductile Iron	1.05	0.06	0.03	101	100
P102	417.27	150.0	Ductile Iron	1.43	0.08	0.05	102	101
P102a	23.77	300.0	Steel	8.90	0.13	0.00	60	102
P103	207.57	450.0	Ductile Iron	28.45	0.18	0.02	60	103
P104	209.09	450.0	Ductile Iron	28.45	0.18	0.02	103	104
P105	211.53	450.0	Ductile Iron	28.45	0.18	0.02	104	105
P106	332.23	300.0	Ductile Iron	3.88	0.05	0.01	18	B-2
P107	113.69	100.0	Cast iron	0.45	0.06	0.01	18	106
P108	145.69	250.0	Ductile Iron	16.57	0.34	0.09	18	B-1
P109	140.82	200.0	Ductile Iron	5.20	0.17	0.04	43	B-4
P110	143.56	150.0	Ductile Iron	2.16	0.12	0.04	56	B-5
P111	113.69	300.0	Ductile Iron	7.26	0.10	0.01	102	B-6
P112	124.36	300.0	Cast iron	3.17	0.04	0.00	100	B-7
P113	101.19	450.0	Ductile Iron	78.26	0.49	0.06	96	B-9
P114	93.88	250.0	Ductile Iron	0.40	0.01	0.00	96	B-8
P115	72.24	600.0	Steel	237.61	0.84	0.08	R-1	55
P116	117.35	900.0	Steel	53.68	0.08	0.00	R-2	32
P117	132.28	300.0	Ductile Iron	5.96	0.08	0.00	74	B-10
P118	7.62	200.0	PVC	21.23	0.68	0.03	66a	66
P150	138.07	152.4	Ductile Iron	-1.07	0.06	0.01	46	150
P151	204.83	152.4	Ductile Iron	-3.66	0.20	0.08	150	151
P151a	139.60	200.0	Ductile Iron	-0.55	0.02	0.00	151	45

Scenario: Option "D" Max Day
Fire Flow Analysis
Reservoir Report

Label	Elevation (m)	Zone	Inflow (l/s)	Calculated Hydraulic Grade (m)
R-1	135.00	Zone	-237.61	135.00
R-2	135.00	Zone	-53.68	135.00

Scenario: Option "D" Max Day



Scenario: Option "D" Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (m)	Type	Demand (Calculated) (l/s)	Calculated Hydraulic Grade (m)	Pressure (m H2O)	Needed Fire Flow (l/s)	Available Fire Flow (l/s)	Satisfies Fire Flow Constraints?
2	74.00	Demand	4.81	126.31	52.204	90.00	N/A	false
3	74.50	Demand	1.83	126.56	51.952	90.00	N/A	false
4	77.50	Demand	0.00	127.15	49.550	90.00	N/A	false
5	79.00	Demand	1.89	127.11	48.011	90.00	N/A	false
6	80.50	Demand	1.66	127.09	46.492	90.00	N/A	false
7	83.00	Demand	0.41	127.07	43.982	90.00	N/A	false
8	86.50	Demand	3.83	127.07	40.484	90.00	N/A	false
9	93.50	Demand	2.33	127.05	33.483	90.00	N/A	false
10	90.00	Demand	2.93	127.05	36.976	90.00	N/A	false
11	86.30	Demand	1.84	127.07	40.686	90.00	N/A	false
12	73.80	Demand	0.00	126.30	52.398	90.00	N/A	false
13	73.60	Demand	0.00	126.30	52.597	90.00	N/A	false
14	71.80	Demand	1.29	126.30	54.391	90.00	N/A	false
15	79.03	Demand	0.00	127.55	48.419	90.00	N/A	false
16	75.87	Demand	2.38	127.53	51.561	90.00	N/A	false
17	72.70	Demand	0.97	127.53	54.718	90.00	N/A	false
18	71.78	Demand	0.00	127.52	55.624	90.00	N/A	false
19	73.03	Demand	0.00	128.24	55.096	90.00	N/A	false
20	74.00	Demand	1.01	127.60	53.489	90.00	N/A	false
21	78.02	Demand	1.00	127.82	49.703	90.00	N/A	false
22	82.04	Demand	0.68	128.15	46.018	90.00	N/A	false
23	85.04	Demand	2.52	128.77	43.641	120.00	N/A	false
24	77.87	Demand	4.97	129.13	51.157	120.00	N/A	false
25	74.28	Demand	0.14	129.13	54.738	90.00	N/A	false
26	76.78	Demand	0.00	129.79	52.907	90.00	N/A	false
27	80.94	Demand	5.74	129.78	48.741	90.00	N/A	false
28	89.25	Demand	1.60	129.94	40.607	90.00	N/A	false
29	94.20	Demand	4.49	131.15	36.880	90.00	N/A	false
30	99.15	Demand	3.02	132.36	33.143	90.00	N/A	false
31	100.25	Demand	1.28	133.21	32.889	90.00	N/A	false
32	103.50	Demand	0.00	135.00	31.432	90.00	N/A	false
33	101.10	Demand	2.05	132.22	31.058	90.00	N/A	false
34	101.75	Demand	2.25	132.19	30.381	90.00	N/A	false
35	102.00	Demand	3.10	132.13	30.072	90.00	N/A	false
36	96.00	Demand	1.67	132.12	36.052	90.00	N/A	false
37	93.01	Demand	0.00	131.74	38.654	90.00	N/A	false
38	92.11	Demand	3.73	130.84	38.654	90.00	N/A	false
39	91.20	Demand	2.61	130.18	38.905	90.00	N/A	false
40	83.85	Demand	1.91	130.16	46.216	90.00	N/A	false
41	76.50	Demand	0.00	130.15	53.547	90.00	N/A	false
42	77.82	Demand	0.97	130.59	52.662	90.00	N/A	false
43	79.13	Demand	1.21	131.02	51.789	90.00	N/A	false
44	86.07	Demand	5.96	131.19	45.031	120.00	N/A	false
45	87.00	Demand	6.53	130.75	43.657	120.00	N/A	false
46	89.00	Demand	4.95	130.44	41.359	120.00	N/A	false
47	91.00	Demand	5.75	130.25	39.172	90.00	N/A	false
48	92.00	Demand	1.16	130.18	38.104	90.00	N/A	false
49	95.00	Demand	0.53	130.08	35.009	90.00	N/A	false
50	94.53	Demand	1.93	130.28	35.678	90.00	N/A	false
51	92.73	Demand	4.11	130.81	38.003	90.00	N/A	false
52	92.28	Demand	3.83	131.00	38.643	120.00	N/A	false

Scenario: Option "D" Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (m)	Type	Demand (Calculated) (l/s)	Calculated Hydraulic Grade (m)	Pressure (m H2O)	Needed Fire Flow (l/s)	Available Fire Flow (l/s)	Satisfies Fire Flow Constraints?
53	93.01	Demand	0.20	131.85	38.760	90.00	N/A	false
54	99.67	Demand	1.11	133.82	34.080	90.00	N/A	false
55	103.50	Demand	0.00	134.69	31.131	90.00	N/A	false
56	79.13	Demand	1.29	131.04	51.807	120.00	N/A	false
57	81.15	Demand	0.72	130.78	49.526	90.00	N/A	false
58	83.17	Demand	2.27	130.55	47.286	90.00	N/A	false
59	85.18	Demand	1.97	130.31	45.033	90.00	N/A	false
60	87.20	Demand	1.93	130.12	42.835	90.00	N/A	false
61	91.43	Demand	1.18	130.01	38.503	90.00	N/A	false
62	95.66	Demand	0.81	129.92	34.188	90.00	N/A	false
63	95.07	Demand	0.00	129.88	34.736	90.00	N/A	false
64	96.20	Demand	0.00	129.77	33.501	90.00	N/A	false
65	98.50	Demand	3.35	132.48	33.914	90.00	N/A	false
66	98.36	Demand	1.16	133.10	34.673	90.00	N/A	false
66a	98.36	Demand	0.00	133.22	34.790	90.00	N/A	false
67	97.25	Demand	3.05	131.46	34.137	90.00	N/A	false
68	96.25	Demand	0.00	130.78	34.460	90.00	N/A	false
69	95.50	Demand	4.82	130.52	34.949	90.00	N/A	false
70	96.50	Demand	2.48	130.37	33.805	90.00	N/A	false
71	96.50	Demand	1.74	129.24	32.677	90.00	N/A	false
72	96.75	Demand	2.52	129.64	32.828	90.00	N/A	false
73	95.00	Demand	3.51	128.83	33.759	90.00	N/A	false
74	92.50	Demand	1.16	128.12	35.544	90.00	N/A	false
75	94.35	Demand	3.60	128.89	34.468	90.00	N/A	false
76	88.50	Demand	97.64	127.26	38.685	90.00	N/A	false
77	94.00	Demand	1.99	128.18	34.112	90.00	N/A	false
78	93.10	Demand	4.60	128.48	35.310	90.00	N/A	false
79	92.20	Demand	1.78	128.86	36.589	90.00	N/A	false
80	93.30	Demand	0.00	128.96	35.590	90.00	N/A	false
81	93.87	Demand	1.99	129.02	35.077	90.00	N/A	false
82	95.55	Demand	0.00	129.25	33.628	90.00	N/A	false
83	96.25	Demand	1.22	129.14	32.822	90.00	N/A	false
84	96.75	Demand	1.11	129.12	32.301	90.00	N/A	false
85	95.50	Demand	1.32	129.11	33.541	90.00	N/A	false
86	94.50	Demand	1.49	129.10	34.530	90.00	N/A	false
87	94.50	Demand	1.49	129.10	34.529	90.00	N/A	false
88	93.70	Demand	0.60	129.10	35.329	90.00	N/A	false
89	94.50	Demand	1.02	128.97	34.396	90.00	N/A	false
90	93.00	Demand	2.49	128.94	35.868	90.00	N/A	false
91	90.30	Demand	0.22	128.88	38.500	90.00	N/A	false
92	87.80	Demand	1.80	128.88	40.995	90.00	N/A	false
93	92.00	Demand	1.23	129.07	36.991	90.00	N/A	false
94	90.00	Demand	1.63	129.47	39.393	120.00	N/A	false
95	93.30	Demand	1.39	129.20	35.830	90.00	N/A	false
96	85.28	Demand	0.00	128.81	43.442	90.00	N/A	false
97	86.23	Demand	0.00	128.85	42.532	90.00	N/A	false
98	91.00	Demand	0.55	129.19	38.115	90.00	N/A	false
99	88.90	Demand	0.00	129.84	40.862	120.00	N/A	false
100	88.90	Demand	0.42	129.84	40.861	90.00	N/A	false
101	87.54	Demand	0.76	129.94	42.313	90.00	N/A	false
102	86.17	Demand	0.43	130.11	43.856	90.00	N/A	false

Scenario: Option "D" Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (m)	Type	Demand (Calculated) (l/s)	Calculated Hydraulic Grade (m)	Pressure (m H2O)	Needed Fire Flow (l/s)	Available Fire Flow (l/s)	Satisfies Fire Flow Constraints?
103	87.63	Demand	0.00	130.05	42.336	90.00	N/A	false
104	88.05	Demand	0.00	129.98	41.846	90.00	N/A	false
105	88.48	Demand	0.00	129.91	41.346	90.00	N/A	false
106	71.50	Demand	0.91	127.47	55.862	90.00	N/A	false
107	89.04	Demand	0.00	127.55	38.429	90.00	N/A	false
150	82.00	Demand	5.19	130.46	48.364	90.00	N/A	false
151	81.00	Demand	0.00	130.74	49.642	90.00	N/A	false
B-1	71.00	Demand	33.14	127.20	56.086	90.00	N/A	false
B-2	71.78	Demand	7.75	127.50	55.604	90.00	N/A	false
B-3	73.50	Demand	57.88	126.05	52.443	90.00	N/A	false
B-4	79.00	Demand	10.40	130.86	51.759	90.00	N/A	false
B-5	79.00	Demand	4.31	130.91	51.807	90.00	N/A	false
B-6	86.00	Demand	14.52	130.09	44.004	90.00	N/A	false
B-7	88.50	Demand	6.34	129.84	41.255	90.00	N/A	false
B-8	85.28	Demand	0.80	128.81	43.442	90.00	N/A	false
B-9	85.00	Demand	156.53	128.59	43.499	90.00	N/A	false
B-10	92.00	Demand	11.92	128.10	36.025	90.00	N/A	false
J-152	0.00	Demand	0.00	129.51	129.244	90.00	N/A	false

Scenario: Option "D" Peak Hour
Steady State Analysis
Pipe Report

Label	Length (m)	Diameter (mm)	Material	Discharge (l/s)	Velocity (m/s)	Pressure Pipe Headloss (m)	From Node	To Node
P-281	135.94	250.0	Cast iron	-34.21	0.70	0.31	98	J-152
P-282	67.36	250.0	Cast iron	-52.23	1.06	0.34	J-152	99
P-283	121.01	300.0	Ductile Iron	-18.01	0.25	0.03	94	J-152
P1	103.63	300.0	PVC	57.88	0.82	0.26	2	B-3
P2	81.99	300.0	Ductile Iron	63.98	0.91	0.25	3	2
P3	186.23	300.0	PVC	65.81	0.93	0.59	4	3
P4	86.56	250.0	PVC	14.89	0.30	0.04	4	5
P5	124.36	250.0	PVC	8.53	0.17	0.02	5	6
P6	122.53	250.0	PVC	6.87	0.14	0.01	6	7
P7	131.06	300.0	PVC	6.46	0.09	0.01	7	8
P8	162.46	200.0	PVC	2.63	0.08	0.01	8	9
P9	197.51	200.0	PVC	0.30	0.01	0.00	9	10
P10	193.24	200.0	PVC	-2.63	0.08	0.02	10	11
P11	165.81	200.0	PVC	-4.47	0.14	0.04	11	5
P12	56.08	150.0	PVC	1.29	0.07	0.01	2	12
P13	40.23	200.0	PVC	1.29	0.04	0.00	12	13
P14	88.70	200.0	PVC	1.29	0.04	0.00	13	14
P15	85.34	300.0	Ductile Iron	80.70	1.14	0.40	15	4
P15a	402.34	100.0	Cast iron	0.00	0.00	0.00	15	107
P16	172.82	300.0	Ductile Iron	8.31	0.12	0.01	15	16
P17	166.12	300.0	Ductile Iron	5.93	0.08	0.01	16	17
P18	63.09	300.0	Ductile Iron	14.78	0.21	0.01	17	18
P19	108.20	200.0	Cast iron	27.02	0.86	0.72	19	18
P20	63.70	100.0	Cast iron	-5.45	0.69	0.64	20	19
P20a	108.81	200.0	Ductile Iron	9.82	0.31	0.07	20	17
P21	165.81	150.0	Ductile Iron	5.38	0.30	0.23	21	20
P22	174.96	150.0	Ductile Iron	6.38	0.36	0.33	22	21
P22a	108.51	300.0	Asbestos Cemen	89.01	1.26	0.60	22	15
P23	96.32	300.0	Asbestos Cemen	96.08	1.36	0.62	23	22
P24	261.82	200.0	PVC	-11.54	0.37	0.36	23	24
P24a	218.24	200.0	Ductile Iron	-17.46	0.56	0.65	24	27
P25	138.99	200.0	PVC	0.94	0.03	0.00	24	25
P25a	95.10	200.0	Cast iron	32.46	1.03	0.89	25	19
P26	220.37	250.0	Cast iron	31.66	0.64	0.66	26	25
P26a	84.43	250.0	Cast iron	-38.21	0.78	0.36	26	41
P27	136.86	250.0	Ductile Iron	-6.55	0.13	0.01	27	26
P28	263.96	250.0	Ductile Iron	16.64	0.34	0.16	28	27
P28a	218.85	300.0	Asbestos Cemen	87.05	1.23	1.17	28	23
P29	215.49	300.0	Asbestos Cemen	89.59	1.27	1.21	29	28
P30	195.38	300.0	Asbestos Cemen	94.08	1.33	1.21	30	29
P31	109.73	300.0	Asbestos Cemen	106.08	1.50	0.85	31	30
P32	227.08	300.0	Asbestos Cemen	107.36	1.52	1.79	32	31
P33	160.63	200.0	PVC	8.98	0.29	0.14	30	33
P34	53.64	200.0	Ductile Iron	6.93	0.22	0.03	33	34
P35	229.21	200.0	PVC	4.68	0.15	0.06	34	35
P36	217.63	200.0	PVC	1.58	0.05	0.01	35	36
P37	151.49	150.0	Cast iron	-7.50	0.42	0.38	37	36
P37a	410.00	450.0	Ductile Iron	-147.48	0.93	0.81	56	53
P38	153.01	200.0	PVC	25.24	0.80	0.90	37	38
P39	150.57	200.0	PVC	21.51	0.68	0.66	38	39
P39a	100.28	200.0	PVC	-15.70	0.50	0.24	28	39

Scenario: Option "D" Peak Hour
Steady State Analysis
Pipe Report

Label	Length (m)	Diameter (mm)	Material	Discharge (l/s)	Velocity (m/s)	Pressure Pipe Headloss (m)	From Node	To Node
P40	188.06	200.0	PVC	3.20	0.10	0.02	39	40
P41	215.19	200.0	PVC	1.29	0.04	0.01	40	41
P42	163.37	250.0	Cast iron	36.92	0.75	0.43	42	41
P43	156.36	250.0	Cast iron	37.89	0.77	0.44	43	42
P44	219.46	250.0	Ductile Iron	18.87	0.38	0.17	44	43
P44a	186.84	250.0	Ductile Iron	39.09	0.80	0.55	37	44
P45	218.54	200.0	Ductile Iron	14.26	0.45	0.45	44	45
P45a	188.37	200.0	Ductile Iron	5.42	0.17	0.06	51	45
P46	202.08	200.0	Ductile Iron	12.06	0.38	0.30	45	46
P47	209.70	200.0	Ductile Iron	9.23	0.29	0.19	46	47
P48	97.23	200.0	Ductile Iron	8.13	0.26	0.07	47	48
P49	188.06	200.0	Ductile Iron	6.97	0.22	0.10	48	49
P50	149.05	300.0	Ductile Iron	41.35	0.59	0.20	50	49
P51	361.19	300.0	Ductile Iron	43.28	0.61	0.53	51	50
P52	90.53	300.0	Ductile Iron	52.81	0.75	0.19	52	51
P52a	126.49	250.0	Ductile Iron	56.64	1.15	0.74	37	52
P53	35.97	300.0	Ductile Iron	63.21	0.89	0.11	53	37
P53a	18.29	250.0	Ductile Iron	56.38	1.15	0.11	53	37
P54	93.88	600.0	Steel	474.13	1.68	0.60	54	66a
P54a	387.10	600.0	Steel	431.67	1.53	1.37	66a	53
P55	206.65	600.0	Steel	475.24	1.68	0.88	55	54
P56	9.45	250.0	Cast iron	-30.64	0.62	0.02	43	56
P56a	404.16	150.0	Cast iron	6.13	0.35	0.70	37	56
P57	205.74	450.0	Ductile Iron	117.37	0.74	0.27	56	57
P57a	75.59	200.0	Ductile Iron	6.22	0.20	0.03	57	151
P58	199.34	450.0	Ductile Iron	110.43	0.69	0.23	57	58
P59	216.10	450.0	Ductile Iron	108.16	0.68	0.24	58	59
P60	188.06	450.0	Ductile Iron	101.54	0.64	0.19	59	60
P60a	216.10	200.0	Ductile Iron	-4.65	0.15	0.06	47	59
P61	210.01	300.0	Cast iron	-24.92	0.35	0.11	61	60
P62	193.55	300.0	Cast iron	-23.74	0.34	0.09	62	61
P62a	92.05	300.0	Ductile Iron	47.79	0.68	0.16	49	62
P63	11.28	300.0	Ductile Iron	-70.72	1.00	0.04	63	62
P63a	819.30	450.0	Concrete	164.39	1.03	1.97	53	63
P64	11.58	300.0	Ductile Iron	-117.09	1.66	0.11	64	63
P65	138.38	150.0	Cast iron	-7.59	0.43	0.36	36	65
P66	122.22	150.0	Cast iron	-10.94	0.62	0.62	65	66
P67	199.03	200.0	Ductile Iron	30.36	0.97	1.65	66	67
P68	99.36	200.0	Ductile Iron	27.31	0.87	0.68	67	68
P69	101.19	200.0	Ductile Iron	16.16	0.51	0.26	68	69
P70	109.42	200.0	Ductile Iron	11.34	0.36	0.15	69	70
P71	328.88	150.0	Ductile Iron	8.86	0.50	1.13	70	71
P71a	498.65	200.0	Ductile Iron	8.62	0.27	0.40	72	71
P72	216.10	150.0	PVC	11.14	0.63	1.14	68	72
P73	169.47	200.0	Ductile Iron	15.75	0.50	0.42	71	73
P74	114.00	150.0	Ductile Iron	12.24	0.69	0.71	73	74
P75	185.32	300.0	Cast iron	-76.10	1.08	0.77	74	75
P75a	194.16	300.0	Cast iron	-79.70	1.13	0.88	75	64
P76	208.79	300.0	PVC	75.26	1.06	0.85	74	76
P77	195.07	200.0	PVC	-22.38	0.71	0.92	76	77
P78	244.14	250.0	PVC	-24.37	0.50	0.30	77	78

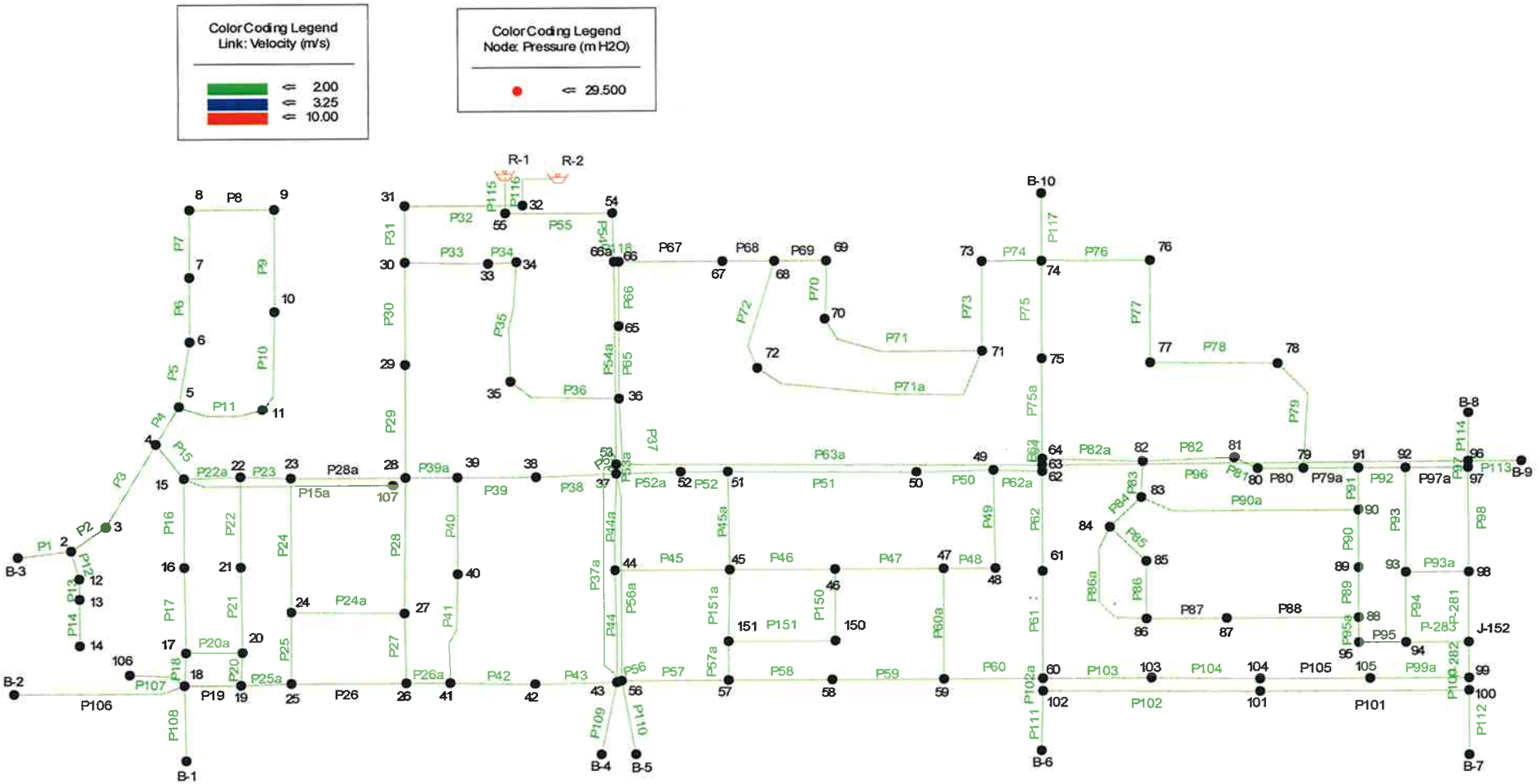
Scenario: Option "D" Peak Hour
Steady State Analysis
Pipe Report

Label	Length (m)	Diameter (mm)	Material	Discharge (l/s)	Velocity (m/s)	Pressure Pipe Headloss (m)	From Node	To Node
P79	225.55	250.0	PVC	-28.97	0.59	0.38	78	79
P79a	103.63	250.0	PVC	-7.65	0.16	0.01	79	91
P80	88.39	250.0	PVC	23.10	0.47	0.10	80	79
P81	50.29	250.0	PVC	23.10	0.47	0.06	81	80
P82	175.87	250.0	Ductile Iron	25.09	0.51	0.23	82	81
P82a	192.63	250.0	Ductile Iron	37.39	0.76	0.52	64	82
P83	69.49	200.0	Ductile Iron	12.30	0.39	0.11	82	83
P84	83.52	200.0	PVC	4.65	0.15	0.02	83	84
P85	95.10	200.0	PVC	2.48	0.08	0.01	84	85
P86	114.00	150.0	PVC	1.16	0.07	0.01	85	86
P86a	253.29	150.0	PVC	1.05	0.06	0.02	84	86
P87	154.23	200.0	PVC	0.73	0.02	0.00	86	87
P88	251.16	200.0	Ductile Iron	-0.76	0.02	0.00	87	88
P89	98.15	150.0	Ductile Iron	-5.41	0.31	0.14	89	88
P90	109.42	200.0	PVC	-4.39	0.14	0.03	90	89
P90a	422.15	200.0	Ductile Iron	6.44	0.20	0.20	83	90
P91	81.99	200.0	Ductile Iron	-8.34	0.27	0.06	91	90
P92	91.44	250.0	Cast iron	0.46	0.01	0.00	91	92
P93	202.08	200.0	PVC	11.64	0.37	0.19	93	92
P93a	121.01	150.0	Asbestos Cemen	4.66	0.26	0.13	98	93
P94	136.25	150.0	Asbestos Cemen	8.22	0.46	0.41	94	93
P95	91.44	150.0	Ductile Iron	-8.17	0.46	0.27	95	94
P95a	48.77	150.0	Asbestos Cemen	-6.78	0.38	0.10	88	95
P96	818.39	450.0	Concrete	118.02	0.74	1.07	63	96
P97	12.80	250.0	Ductile Iron	-39.31	0.80	0.04	96	97
P97a	121.01	250.0	Cast iron	10.31	0.21	0.03	92	97
P98	202.69	250.0	Cast iron	-29.01	0.59	0.34	97	98
P99a	190.50	450.0	Ductile Iron	56.89	0.36	0.06	105	99
P100	24.08	250.0	Ductile Iron	4.67	0.10	0.00	99	100
P101	402.03	150.0	Ductile Iron	2.09	0.12	0.10	101	100
P102	417.27	150.0	Ductile Iron	2.85	0.16	0.18	102	101
P102a	23.77	300.0	Steel	17.80	0.25	0.01	60	102
P103	207.57	450.0	Ductile Iron	56.89	0.36	0.07	60	103
P104	209.09	450.0	Ductile Iron	56.89	0.36	0.07	103	104
P105	211.53	450.0	Ductile Iron	56.89	0.36	0.07	104	105
P106	332.23	300.0	Ductile Iron	7.75	0.11	0.02	18	B-2
P107	113.69	100.0	Cast iron	0.91	0.12	0.04	18	106
P108	145.69	250.0	Ductile Iron	33.14	0.68	0.32	18	B-1
P109	140.82	200.0	Ductile Iron	10.40	0.33	0.16	43	B-4
P110	143.56	150.0	Ductile Iron	4.31	0.24	0.13	56	B-5
P111	113.69	300.0	Ductile Iron	14.52	0.21	0.02	102	B-6
P112	124.36	300.0	Cast iron	6.34	0.09	0.01	100	B-7
P113	101.19	450.0	Ductile Iron	156.53	0.98	0.22	96	B-9
P114	93.88	250.0	Ductile Iron	0.80	0.02	0.00	96	B-8
P115	72.24	600.0	Steel	475.24	1.68	0.31	R-1	55
P116	117.35	900.0	Steel	107.36	0.17	0.00	R-2	32
P117	132.28	300.0	Ductile Iron	11.92	0.17	0.02	74	B-10
P118	7.62	200.0	PVC	42.47	1.35	0.12	66a	66
P150	138.07	152.4	Ductile Iron	-2.12	0.12	0.02	46	150
P151	204.83	152.4	Ductile Iron	-7.31	0.40	0.28	150	151
P151a	139.60	200.0	Ductile Iron	-1.09	0.03	0.00	151	45

Scenario: Option "D" Peak Hour
Steady State Analysis
Reservoir Report

Label	Elevation (m)	Zone	Inflow (l/s)	Calculated Hydraulic Grade (m)
R-1	135.00	Zone	475.24	135.00
R-2	135.00	Zone	107.36	135.00

Scenario: Option "D" Peak Hour



Urban Systems Ltd
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

City of Surrey

West Newton/ Highway 10

Neighbourhood Concept Plan Engineering Servicing Plan

APPENDIX D

PROJECTED DCC REVENUES

City of Surrey

West Newton/ Highway 10

Neighbourhood Concept Plan Engineering Servicing Plan

Projected DCC Revenues

Sanitary

Land Use	Number of units (sq.ft. for MF, comm.)	DCC Rate	DCC Revenue
RF, RF-12	420	$ 820.00	$ 344,400.00
RF-9	310	$ 745.00	$ 230,950.00
RM-10, RM-30	264,000	$ 0.46	$ 121,440.00
Commercial	52	$ 248.00	$ 12,896.00
		Total Revenue	**$ 709,686.00**

Notes:
1. Based on 1200sq.ft. units
2. RM area equal to attached housing (CD RM-30, 150 units), seniors (CD RM-30, 40 units) and single detached (RM-10, 30 units)

Water

Land Use	Number of units (sq.ft. for MF, comm.)	DCC Rate	DCC Revenue
RF, RF-12	420	$ 951.00	$ 399,420.00
RF-9	310	$ 865.00	$ 268,150.00
RM-10, RM-30	220,000	$ 0.54	$ 118,800.00
Commercial	52	$ 288.00	$ 14,976.00
		Total Revenue	**$ 801,346.00**

Notes:
1. Based on 1000sq.ft. units
2. RM area equal to attached housing (CD RM-30, 150 units), seniors (CD RM-30, 40 units) and single detached (RM-10, 30 units)

Drainage

Land Use	Number of units (sq.ft. for MF, comm.)	DCC Rate	DCC Revenue
RF, RF-12	420	$ 2,618.00	$ 1,099,560.00
RF-9	310	$ 1,545.00	$ 478,950.00
RM-10, RM-30	264,000	$ 1.01	$ 266,640.00
Commercial	52	$ 1,702.00	$ 88,504.00
		Total Revenue	**$ 1,933,654.00**

Notes:
1. Based on 1200sq.ft. units
2. RM area equal to attached housing (CD RM-30, 150 units), seniors (CD RM-30, 40 units) and single detached (RM-10, 30 units)

Projected DCC Revenues (cont'd)

Major Collector

Land Use	Number of units (sq.ft. for MF, comm.)	DCC Rate	DCC Revenue
RF, RF-12	420	$ 1,394.00	$ 585,480.00
RF-9	310	$ 1,269.00	$ 393,390.00
RM-10, RM-30	264,000	$ 0.59	$ 155,760.00
Commercial	52	$ 599.00	$ 31,148.00
		Total Revenue	**$ 1,165,778.00**

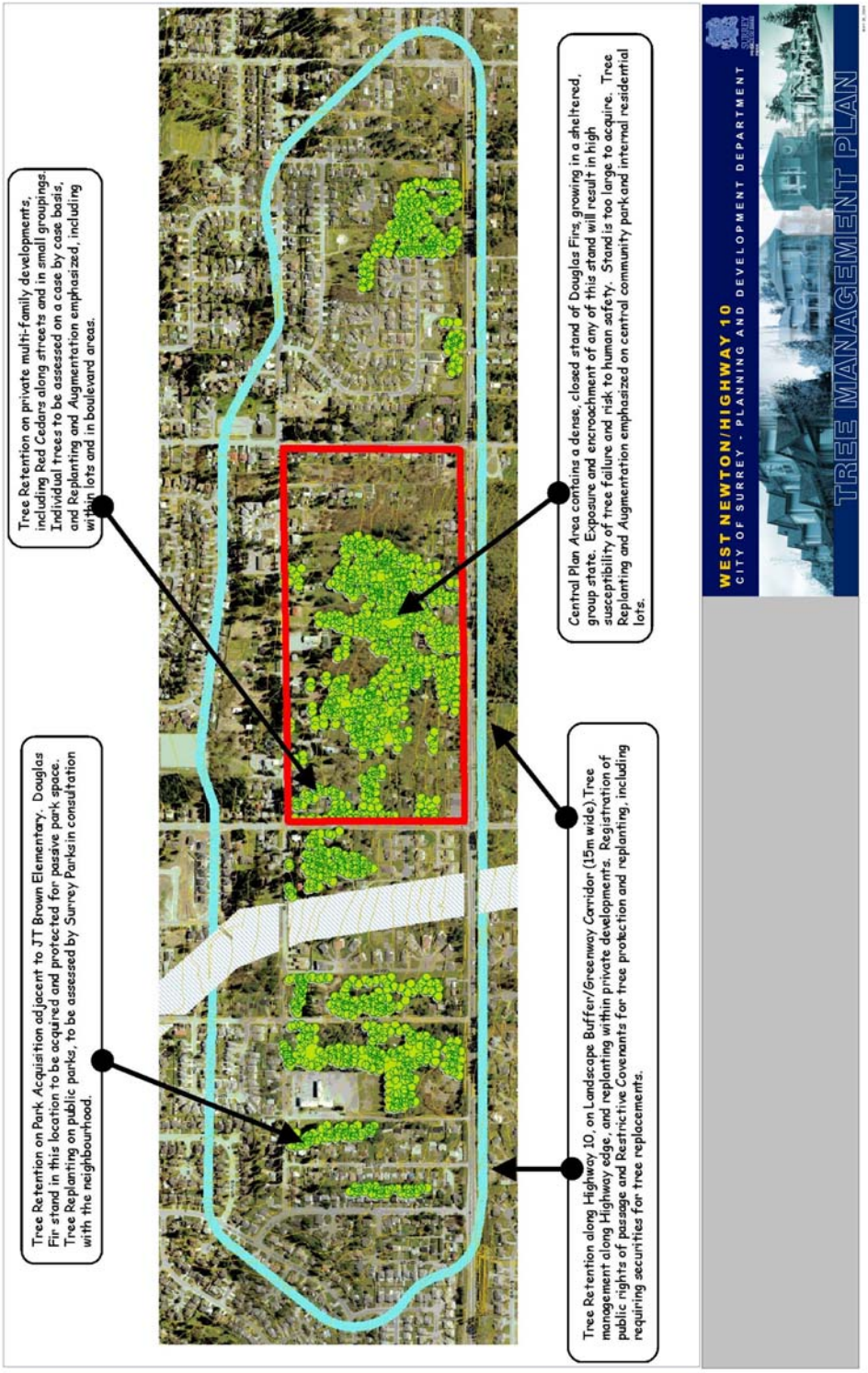
Notes:
1. Based on 1200sq.ft. units
2. RM area equal to attached housing (CD RM-30, 150 units), seniors (CD RM-30, 40 units) and single detached (RM-10, 30 units)

Arterials

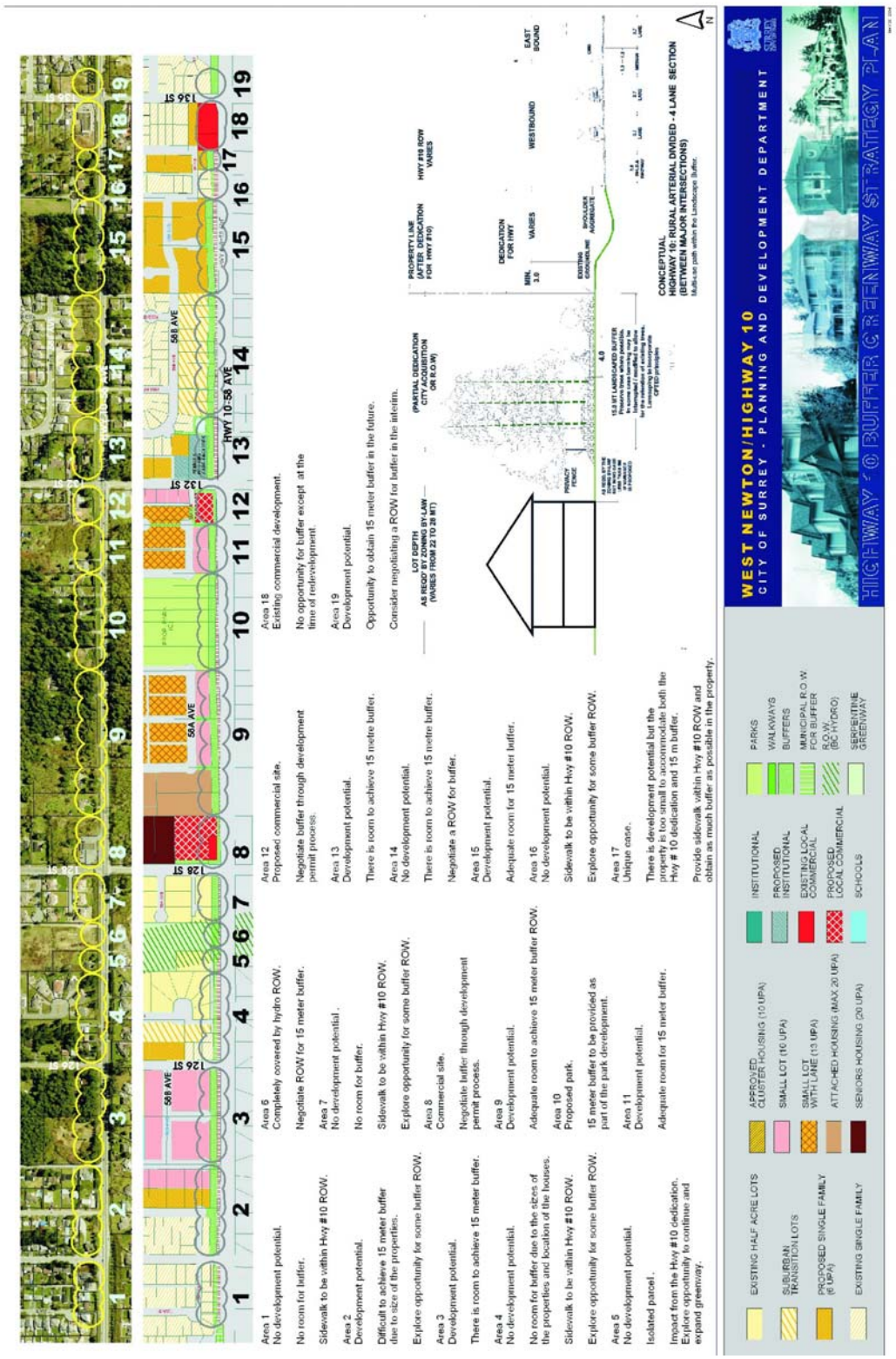
Land Use	Number of units (sq.ft. for MF, comm.)	DCC Rate	DCC Revenue
RF, RF-12	420	$ 5,517.00	$ 2,317,140.00
RF-9	310	$ 5,020.00	$ 1,556,200.00
RM-10, RM-30	264,000	$ 2.35	$ 620,400.00
Commercial	52	$ 2,372.00	$ 123,344.00
		Total Revenue	**$ 4,617,084.00**

Notes:
1. Based on 1200sq.ft. units
2. RM area equal to attached housing (CD RM-30, 150 units), seniors (CD RM-30, 40 units) and single detached (RM-10, 30 units)

Part V: Appendices



Appendix I - Tree Management Plan



Appendix II - Highway 10 Buffer & Greenway Strategy

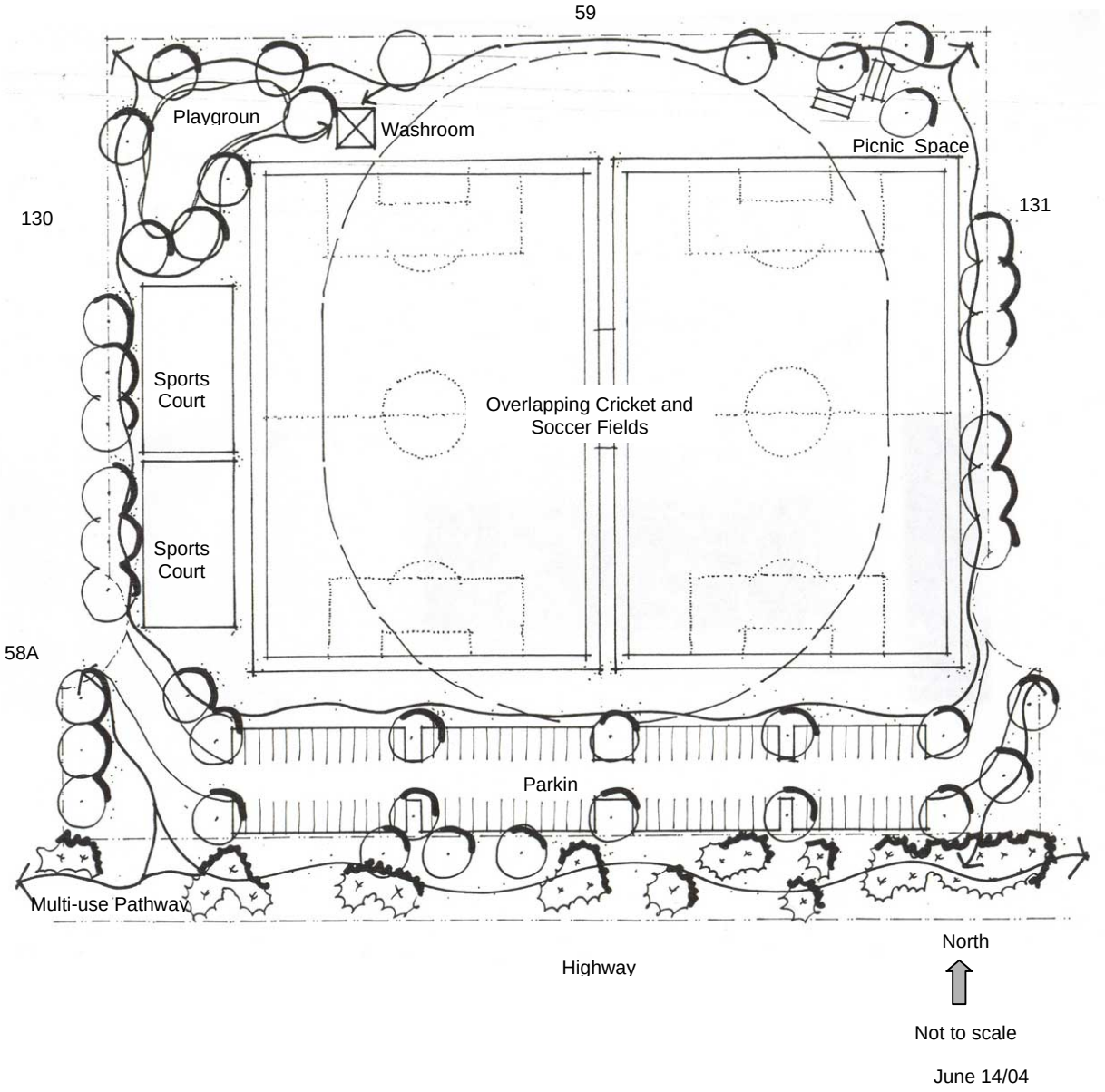
CAPITAL COST ESTIMATE
PROPOSED WEST NEWTON HWY 10 CONCEPT PLAN
PARK SITES, GREENWAY, BUFFER

PARK WORKS

ITEM	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL
1	**COMMUNITY PARK SITE 59 AVE AT 130 ST**				
	b) Soccer Field				
	includes design, construction and environmental control	ls	1	$196,000.00	$196,000.00
	c) Supporting Amenities				
	not included here - other source DCC, Capital, etc.				
	TOTAL - COMMUNITY PARK SITE	***$196,000.00***			
2	**PANORAMA (NEIGHBOURHOOD ACTIVE PARK)**				
	design and construction, neighbourhood amenities	ls	1	$122,000.00	$122,000.00
	TOTAL - PANORAMA	***$122,000.00***			
3	**JT BROWN (NEIGHBOURHOOD NATURE PARK)**				
	tree management, planting, trails, fencing	ls	1	$42,525.00	$42,525.00
	TOTAL - JT BROWN	***$42,525.00***			
4	**SERPENTINE GREENWAY**				
	(DCC funded)				
5	**HIGHWAY 1O BUFFER**				
	pathways, drainage, tree management and replanting	ls	1	$545,000.00	$545,000.00
	TOTAL - HWY 10 BUFFER	***$630,000.00***			
				SUBTOTAL	$905,525.00
	estimated units: 950			15% CONTINGENCY	$135,828.75
	amenity charge: $1096.16			**TOTAL**	***$1,041,353.75***

Appendix III - Estimated Costs of Park Works

Central Park Concept Plan
West Newton/Hwy 10 NCP



Note: This plan is conceptual: final location and configuration of sports fields, parking, and supporting amenities to be determined in consultation with the community prior to development.

Appendix IV - Conceptual Layout of the Community Park

Appendix V

Council Resolution and West Newton/Highway 10 NCP - Stage 2 Corporate Report

REGULAR COUNCIL (SPECIAL) MINUTES
TUESDAY, JULY 28, 2004

Item No. C007 West Newton/Highway 10 Neighbourhood Concept Plan - Stage 2 Report
File: 6250-20 (West Newton/Hwy 10)

It was Moved by Councillor Higginbotham
Seconded by Councillor Tymoschuk
That Council:

1. Approve the final and complete West Newton/Highway 10 Neighbourhood Concept Plan ("NCP"), as contained in Appendix I, as a means to manage development of the West Newton/Highway 10 neighbourhood and to provide services, amenities and facilities in support of the development of this neighbourhood;

2. Instruct the City Clerk to introduce a by-law to amend the Official Community Plan ("OCP"), as documented in Appendix II, to add the West Newton/Highway 10 NCP area to Figure 27 entitled "Map Showing Recently Approved Secondary Plans";

3. Instruct the City Clerk to introduce a by-law to amend Surrey Zoning By-law, 1993, No. 12000 (the "Zoning By-law), as documented in Appendix III, to require amenity contributions for the West Newton/Highway 10 neighbourhood, based upon the density bonus concept;

4. Instruct staff to bring forward any necessary OCP land use designation amendments concurrently with the related site specific rezoning application in the West Newton/Highway 10 neighbourhood; and

5. Instruct the Parks, Recreation and Culture Department to prepare a plan to acquire and develop the landscaped buffer and multi-use pathway along Highway 10, as generally described in the West Newton/Highway 10 NCP and to develop a strategy to provide on-going maintenance of the buffer.

RES.R04-2235 Carried

SURREY
CITY OF PARKS

Corporate Report

NO: C007

COUNCIL DATE: July 26, 2004

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**July 22, 2004**
FROM:	**General Manager, Planning and Development**	FILE:	**6520-20 (West Newton/Hwy 10)**

SUBJECT: **West Newton/Highway 10 Neighbourhood Concept Plan - Stage 2 Report**

RECOMMENDATION

The Planning and Development Department recommends that Council:

1. Approve the final and complete West Newton/Highway 10 Neighbourhood Concept Plan ("NCP"), as contained in Appendix I, as a means to manage development of the West Newton/Highway 10 neighbourhood and to provide services, amenities and facilities in support of the development of this neighbourhood;

2. Instruct the City Clerk to introduce a by-law to amend the Official Community Plan ("OCP"), as documented in Appendix II, to add the West Newton/Highway 10 NCP area to Figure 27 entitled "Map Showing Recently Approved Secondary Plans";

3. Instruct the City Clerk to introduce a by-law to amend Surrey Zoning By-law, 1993, No. 12000 (the "Zoning By-law), as documented in Appendix III, to require amenity contributions for the West Newton/Highway 10 neighbourhood, based upon the density bonus concept;

4. Instruct staff to bring forward any necessary OCP land use designation amendments concurrently with the related site specific rezoning application in the West Newton/Highway 10 neighbourhood; and

5. Instruct the Parks, Recreation and Culture Department to prepare a plan to acquire and develop the landscaped buffer and multi-use pathway along Highway 10, as generally described in the West Newton/Highway 10 NCP and to develop a strategy to provide on-going maintenance of the buffer.

INTENT

The purpose of this report is to:

1. Obtain Council approval for the final and complete West Newton/Highway 10 NCP; and

2. Obtain Council approval to bring forward the necessary by-laws to formalize the amenity contribution requirements for this NCP and to recognize the West Newton/Highway 10 NCP within the OCP.

BACKGROUND

The West Newton/Highway 10 NCP neighbourhood is situated at the southerly limit of Newton, bordered by 60 Avenue to the north, Highway 10 to the south, 124 Street to the west and 136 Street to the east (Appendix IV). The Plan area comprises approximately 100 hectares (250 acres) of land, currently designated for a mix of Urban and Suburban uses in the OCP. The central suburban area, between 128 Street and 132 Street, contains large properties, which currently lack municipal services and utilities. In March of 2002, a delegation representing a majority of the property owners from this central area requested that a NCP be prepared for the area. In response, Council authorized staff to commence a planning process towards the preparation of an NCP for the West Newton/Highway 10 neighbourhood.

On January 26, 2004, Council approved the Land Use Plan (Stage I of the NCP) for the neighbourhood (Corporate Report No. L018). Council then authorized staff to proceed with the Stage II component of the NCP that included resolving several outstanding land use issues and preparing the final servicing, phasing and financing strategy and amenity contribution requirements to implement the Land Use Plan.

DISCUSSION

The Land Use Plan

The proposed Final Land Use Plan for the West Newton/Highway 10 area, shown in Appendix VI, provides for a predominantly single family residential neighbourhood, consisting of a variety of densities and unit types. It creates a logical extension of the West Newton South NCP where single-family residential uses are the primary land uses.

The single family residential land uses include Suburban Transition Lots (at a density of between 2 units per acre to 6 units per acre), conventional Single Family Lots (at 6 units per acre), Small Lots (at 10 units per acre) and Small Lots With Lanes (at 13 units per acre). The residential land uses proposed at the interface with the existing residential development are compatible in density and character with the adjacent residential uses and are intended to provide a compatible transition between land uses of lower and higher densities. The central area between 128 Street and 132 Street is designated primarily for single-family lots with rear lanes. This area now contains large, underdeveloped properties and has the greatest potential to create pedestrian friendly streets in keeping with the OCP policies.

Further, to comply with the OCP policies on complete communities and variety of housing forms, portions of the Plan area are designated for multiple residential uses and seniors housing. Local commercial nodes are proposed at the intersections of 128 Street and 132 Street with Highway 10. These nodes are located within the walking distance of the proposed residential areas.

The Land Use Plan, when fully implemented, is expected to generate 950 new residential units resulting in an additional population of approximately 2,880 people. The total population of the area at build-out is expected to be between 4,200 to 4,500 people.

Two new neighbourhood parks are proposed in the Plan area. Both parks are on 60 Avenue, one located to the west of 126 Street next to J. T. Brown Elementary School and the other to the east of 128 Street. Aspen Park, an existing neighbourhood park, is located to the east of 132 Street. A community park is proposed on 59 Avenue, between 130 Street and 131 Street.

The Plan also proposes two greenways through the neighbourhood:

- The Serpentine Greenway, located along the BC Hydro corridor to the west of 128 Street, will incorporate a multi-use pathway to provide an off-street recreational linkage between Newton and the Serpentine River; and

- The Highway 10 Buffer/Greenway, a 15 metre wide landscaped buffer, is proposed along the north side of Highway 10. The 15-metre wide buffer, plus a minimum 5 metre setback to buildings, will provide a physical separation between residential developments and the highway, to mitigate highway traffic impacts on the developments in the vicinity of Highway 10. The buffer is to be provided outside of the land required for the highway widening. A multi-use pathway will be incorporated in the buffer to create a linkage between Newton and Cloverdale, as part of Surrey's greenway system.

The final Land Use Plan is consistent with the Stage I Land Use Plan approved by Council in January 2004, with one exception. The final Land Use Plan shows an alternative land use scenario (Optional Land Use Plan) for a portion of the land located in the area bounded by Highway 10, 129 Street, 59 Avenue and 130 Street. The Small Lots with Lanes (13 upa) designation along 59 Avenue and on 130 Street, across from the community park, and the Small Lots (10 upa) designation along Highway 10, remain identical in both scenarios. However, in the Optional Land Use Plan, on the interior lands in this area, the land use designation is changed from Small Lots with Lanes (13 upa) to Small Lots (10 upa) and the road pattern is re-oriented to an east-west orientation. This alternative land use scenario was developed as a result of discussions with an applicant who has submitted a rezoning application for these lands after Stage I of the NCP was approved by Council. This is will be further discussed later in this report.

Tree Preservation

Portions of the area to the east of J. T. Brown Elementary School, the area between 128 Street and 132 Street and a small area to the east of 132 Street, are well treed. Most of the trees next to J. T. Brown Elementary School are within the proposed neighbourhood park. This park is proposed to be a passive park, which will permit the retention of a number of trees. The proposed community park to the south of 59 Avenue, between 130 Street and 131 Street, presents limited opportunities for tree preservation because of the need to accommodate playing fields to meet the recreational needs of the community. Tree preservation within the proposed 15-metre wide buffer along Highway 10 will be addressed in conjunction with the preparation of the plans for this buffer. Opportunities to preserve on development sites will be explored on a site-by-site basis at the time of reviewing the development application for each site.

Land Use Issues

There were four outstanding land use issues at the time the Stage I component was approved by Council, in January 2004. These issues were to be addressed as part of the Stage II component of the Plan development. Appendix VII illustrates the location of areas where land use issues were to be addressed. The following describes each issue and the recommended resolution of the issue, as contained in the final NCP document:

1. **Northwest Corner of Highway 10 and 126 Street**

The owners of two properties, at the northwest corner of Highway 10 and 126 Street, were interested in having this land designated to allow townhouses at a density of 30 units per acre. Originally these properties were being considered for townhouses at 15 units per acre. However, the Stage I Land Use Plan designated these lands Small Lots (10 upa) in response to comments received from a majority of the owners of properties to the west of the BC Hydro corridor, who requested that the single family character of the area should be reinforced by designating the subject lands for single family residential uses.

The City has now received an application (No. 7904-0058-00) for the two subject properties, to rezone these sites from RF to RF-12 to create approximately 19 single-family lots. The proposed rezoning is in keeping with the proposed land use designation on the Land Use Plan, which is Small Lots (10 upa).

Resolution of Issue:

The property owners have withdrawn their request for redesignation and are proceeding with their application on the basis of the Small Lot (10 upa) designation. This issue has been resolved.

2. **Northeast Corner of Highway 10 and 126 Street**

During the development of the Stage I Land Use Plan, five of the six owners of the existing single family lots (non-conforming sized lots under the RA Zone) at the northeast corner of Highway 10 and 126 Street, requested a designation that would allow a higher density residential use on their lands instead of the Existing Single Family designation, as shown on the Land Use Plan. The five properties are developed with houses, which appear to be in good condition.

The request for a designation of these lands for higher density residential uses, related to the possible future redevelopment of these properties and to offset the potential loss of land for three of the five properties for the widening of Highway 10. The proposed designation of Existing Single Family reflects the existing situation and is consistent with the designation of other properties to the north. A lack of detailed information on the highway widening at the time of the Stage I plan approval left some uncertainty about the actual impact of the highway widening on the subject properties.

Resolution of Issue:

It is recommended that the current designation of Existing Single Family be retained for the subject lots. Plans for the Highway 10 widening are still being finalized. It is anticipated that the highway plans will be finalized by mid 2005. The currently proposed land use designation can be revisited when the highway plans are finalized and made public, and the subject property owners are prepared to jointly consider submission of an application for redevelopment of their properties.

3. **Southeast Corner of 128 Street and 60 Avenue**

Four properties, at the southeast corner of 128 Street and 60 Avenue, are designated "Attached Housing" (Maximum 20 upa) on the Land Use Plan. The focus of this designation was to provide opportunity for multi-family housing in the neighbourhood, which is largely dominated by single-family residential uses. These properties contain large red cedar trees, both in clusters and as individual trees. The property owners have requested a redesignation from the "Attached Housing" designation to a designation that would allow the development of small single-family lots on these sites. The owners have cited strong market demand for small single-family lots as the reason for their request. They have also submitted a petition in favour of such a redesignation signed by a majority of the property owners on 128 Street and 60 Avenue, across from the subject properties. At present, the City has received a development application for two of the four properties that front 128 Street (No. 7904-0068-00) to rezone these sites from RA to RF-12 to permit subdivision into 12 small lots.

The "Attached Housing" designation reflects the fact that these properties are near the future commercial centre at 128 Street and Highway 10. It also responds to the OCP policies related to providing opportunities for a variety of housing options as part of complete communities. This designation would also better facilitate the retention and protection of mature trees, as part of multi-family development, by providing more flexibility to locate buildings away from trees in comparison to development of single-family lots.

The applicant has advised that they can demonstrate that the trees can be preserved on single-family lots by making some of the lots larger to accommodate the existing trees. The applicant has also proposed to incorporate coach houses on the single family lots, which will result in a higher residential density to support the proposed commercial centre on 128 Street at Highway 10 and support the OCP policies, related to providing a range of housing types in the neighbourhood.

Resolution of Issue:

A redesignation of the site to permit the small single-family lots with coach houses is reasonable, provided that a significant number of the existing trees are preserved. A site-specific Comprehensive Development Zone may be required. The provision of coach houses, as a requirement rather than an option on these lots, would be necessary to demonstrate a diversity of housing types. Area residents have expressed opposition to allowing secondary suites in the area. These concerns would need to be resolved during the application review process.

It is proposed that the Attached Housing designation on the four subject properties remain unchanged in the Stage II Plan, at this time. If the owners submit a rezoning application that meets the objectives of tree retention and housing diversity, an NCP Amendment process would be required, which would include consultation with the area residents, resolution of any neighbourhood concerns, as well as the need to address servicing and amenity impacts.

4. **Highway 10 Landscape Buffer/Greenway**

The Land Use Plan shows a buffer/greenway along Highway 10. The buffer is 15 metres wide from the edge of the widened Highway 10 road dedication. The existing Highway 10 dedication will be widened between approximately 3 metres to 12 metres, depending on the location along the Plan area. A number of property owners with properties abutting Highway 10, between 128 Street and 132 Street, have expressed concerns about the impacts of the proposed 15-metre wide buffer on the development potential of their properties. They are also concerned about having to give up more than 5% of their land for open space, for the purpose of providing the buffer.

Resolution of Issue:

The 15-metre width for the buffer has been a standard requirement for developments abutting Highway 10, to create a green edge along the highway in keeping with Council's direction. This width, coupled with the requirement for a minimum of 5-metre building setback from the edge of the buffer, will result in a total of 20 metres of physical separation between buildings and the edge of the Highway 10 road allowance. This separation will act to mitigate the impacts that highway traffic will have on the adjacent development. To alleviate the concern about having to give up more than 5% of their land, the City will purchase any land required to make up the 15-metre buffer beyond the 5% park dedication on larger properties. On other properties, a public right-of-way may be acceptable to achieve the buffer, in which case the property covered by the right-of-way will still be available for the purposes of density calculations on the remaining

developable property. Park Amenity Contributions will be used to implement the landscaping in the buffer.

A more detailed strategy for the acquisition of the greenway/buffer is outlined later in this report.

One additional land use issue surfaced during the process of completing Stage II of the NCP planning process (identified as #5 on the map in Appendix VII), as follows:

5. **Southeast Corner of 59 Avenue and 129 Street**

The owner of the two properties bounded by 129 Street, the proposed community park (i.e., 130 Street), 59 Avenue and Highway 10, requested these properties Small Lots (10 upa) [RF-12] rather than Small Lots with Lanes (13 upa) [RF-9], as illustrated on the Stage I Land Use Plan. He cited market demand as the reason for his request.

The Small Lot with Lanes (RF-9) designation on the Stage I Plan was intended to provide opportunities for a diversity of single-family lot and house types, to create pedestrian friendly streets and to provide "eyes" on the street.

The applicant advised that, due to the configuration of the property, the resulting lots would be very deep. The owner also preferred an east-west road orientation. After reviewing the impact of the proposal, staff concluded that a partial redesignation of Small Lots (10 upa) could be supported without significant impact on the NCP objectives, provided that the Small Lots with Lanes (13 upa) designation is retained along the edges of this block facing 59 Avenue and 130 Street, across from the park. The applicant has provided a plan showing RF-9 lots with lane access along 59 Avenue and 130 street, with RF-12 lots on the remaining area within the block. The re-orientation of the internal roads from north south to east-west creates more lots with a southerly exposure and contributes to energy efficiency, which is consistent with OCP objectives.

Resolution of Issue:

The proposed changes (redesignation and road pattern) to the subject site on the Stage I Land Use Plan, do not significantly affect the intent of Plan. The proposed changes are shown as an optional plan on the final Land Use Plan (see Appendix V).

Highway 10 Buffer/Greenway Strategy

During consideration of the Stage I Land Use Plan, Council stated that it would like to achieve the proposed 15-metre landscaped buffer/greenway along Highway 10 as soon as

possible, where possible, in advance of development and directed staff to prepare a strategy for its implementation.

Staff has completed a preliminary analysis of the existing conditions along Highway 10, to determine the opportunities and constraints to achieving the full buffer in a timely manner. The analysis revealed that the full 15-metre wide and continuous buffer will be difficult to achieve in the short term, given constraints such as the size of certain properties abutting the highway, limited potential for development of some parcels and the location of existing houses and other buildings on some of the properties (Appendix VIII). The full buffer can be achieved primarily in the central area of the neighbourhood, between 128 Street and 132 Street and in sections east and west of this area, where properties are relatively large and have development potential in accordance with the Plan.

To expedite the acquisition and development of the buffer, the Parks, Recreation and Culture Department proposes to purchase the land required for the buffer beyond the 5% park dedication requirement on properties with development potential. On other properties with limited or no development potential, staff will contact the owners to negotiate the registration of a public right-of-way for the buffer/walkway. Where the buffer, either through part dedication/part purchase or right-of-way cannot be obtained or is inadequate to provide a pathway, the Highway 10 Project Team (Ministry of Highways) has agreed to allow the construction of a sidewalk within the Highway 10 road allowance to allow for continuation of the walkway along the entire length of the neighbourhood. As the buffer is considered a park amenity, the cost of implementing the landscaping and walkway will be recovered through the NCP park amenity contributions.

Appendix VIII documents the strategy to be applied in support of achieving the Highway 10 buffer. Despite this strategy, it will take some time to fully implement the buffer. However, given the continuing market demand for housing and rapid rate of development in the adjacent West Newton South area, it is probable that the West Newton/Highway 10 area will also undergo development in a relatively short timeframe and the majority of the buffer will be realized in the next couple of years.

Public Consultation

A number of opportunities were provided for public input and comment during the preparation of the NCP. The following lists the public participation in the process:

1. A delegation and petition received by Council from property owners (representing 64% of the owners and 72% of the land within the area bounded by Highway 10, 60 Avenue, 128 Street and 132 Street) to request authorization for the preparation of an NCP (February 2002);

2. Public Open House #1 - Background information, issues, opportunities and constraints, land use and planning objectives (June 2002);

3. Citizens Advisory Committee ("CAC") formed in November 2002 and CAC meetings held at milestones during the planning process;

4. Public Open House #2 - Preliminary land use options and selection of a preferred land use option (June 2003);

5. Public Open House #3 – Review and comment on the preferred land use option and preliminary servicing and transportation management strategy (July 2003);

6. Public Open House #4 – Review and comment on the proposed final land use option (November 2003);

7. Corporate Report to Council - Council approved the Land Use Plan -Stage I (January 2004); and

8. Public Open House #5 (Final) – Review and comment on staff recommendations on the outstanding land use issues and proposed revision to the land use plan, servicing, financing and phasing strategy and amenity contributions (May 2004).

Questionnaires were used to solicit written comments at each Public Open House. Before each public open house, staff held a meeting with the CAC and with stakeholders to discuss the results of the previous public open house and to advise as to how public comments/concerns had been addressed. Input to the development of the plan was also received by way of written submissions from individual property owners and others and through meetings with owners on site-specific issues.

After Public Open House #1, comments from a number of residents objecting to secondary suites in the area led to land use options including more small lots and townhouses. Small lots provide opportunities for smaller, more affordable units, reducing the need for secondary suites. Unauthorized secondary suites in townhouses have not been prevalent in the City.

The final Public Open House, held on May 26, 2004 was attended by 116 people. The following information was presented:

- The Council-approved Stage I Land Use Plan was reviewed;

- Land use issues carried forward from the Stage I process were presented, along with staff recommendations on their resolution;

- A draft strategy for the implementation of a Highway 10 buffer was presented; and

- The draft servicing, financing and phasing plans and amenity contributions for the NCP were presented.

The Land Use Plan was supported by a majority of the people who attended the open house in November 2003, prior to Council's approval in January 2004, of the Stage I NCP. Therefore, no comments were specifically requested on the land use plan at the final open house. The comments from the questionnaire that was distributed at this open house, along with staff's response, are documented in the following paragraphs. A total of 26 completed comment sheets were submitted to City staff at or after the open house.

- **Comments on a proposed alternative land use scenario to the southeast of 59 Avenue and 129 Street.**

  Twenty-two people responded, nine of which stated no objection to the proposed alternative land use scenario. One person suggested that there should be no change to the Stage I Plan. Other comments, although noted under "Response to the Proposed Alternative Land Use Scenario", were not related to its impact. These other comments related primarily to the traffic impact on 124 Street and were primarily expressed by the Boundary Park residents. In this regard, the servicing plan proposes traffic circles at the intersections of Boundary Park Drive with 124 Street and 60 Avenue and traffic calming on 60 Avenue. The Engineering Department has retained a consultant to assess the traffic situation along the entire 124 Street to 64 Avenue and to recommend traffic calming solutions in consultation with the Boundary Park residents.

- **Proposed strategy for the Highway 10 landscaped buffer.**

  Fourteen responses were received. Six responses were positive. Two people expressed concerns. One concern was with regard to expropriation of land for the buffer, which the City does not intend to pursue. One concern was about the unkempt state of the existing buffer between 136 Street and King George Highway. The Parks, Recreation and Culture Department advised that this buffer was obtained before there was an NCP for the area and there was no strategy for its development and maintenance. This will not be the case with the buffer proposed as part of the West Newton/Highway 10 NCP, for which there will be both an acquisition and construction strategy, as well as an on-going maintenance program. Six comments related to how the buffer will be incorporated in subdivisions and administered.

- **Proposed servicing and financing strategy and amenity contributions.**

  Ten responses were received. Three comments were positive. Seven people expressed concern primarily related to the capacity of services and impact on property taxes. The proposed amenity contribution is approximately $1,518 per dwelling unit versus $1,106 per dwelling unit for the West Newton South NCP. However, the difference is largely due to the development of park amenities in West Newton/Highway 10 ($1,096 in West Newton/Highway 10 versus $848 in West Newton South), particularly the Highway 10 buffer.

Amenity Requirements

To address the impact of new growth, in West Newton/Highway 10, in accordance with Council policy, all new residential development will be required to make a monetary contribution towards the provision of new police, fire protection and library services and development of the parks, including the Highway 10 buffer/greenway. Commercial developments contribute to fire and police amenities, but are exempt from contributing toward park/buffer development and library services, as such development has minimal impact on the need for these services.

The monetary contributions toward police, fire and library materials will offset the capital costs of providing these services for the new development in the area. The contributions for such services are collected on a standardized basis in all of Surrey's NCP areas. Monetary contributions toward park development are based on an estimate of the capital costs of the development of NCP-specific amenities. In the West Newton/Highway 10 neighbourhood, the following park development and amenities are to be funded by the amenity contributions:

- a soccer field and other amenities in the proposed community park;
- the provision of neighbourhood park amenities in the Panorama Park, east of 128 Street;
- tree management and trails in the J. T. Brown Park, west of 128 Street; and
- landscaping, tree management and walkway construction in the Highway 10 buffer.

In the case of the community park, monies for any additional facilities and improvements will come from other funding sources (such as Development Cost Charges, capital budget, etc.), given that the park will be a community-scale amenity.

The following table summarizes the applicable amenity contributions (per dwelling unit or acre) by land use and also provides an estimate of the total revenue the City can expect from the contributions at build out of the NCP:

West Newton/Highway 10 Neighbourhood Concept Plan **Amenity Contributions**			
	Residential Contribution Per Unit/Lot (Based on 950 New Dwelling Units)	*Non-residential Contribution Per Acre (Based on 3 Acres)*	*Anticipated Revenue at Build-out*
Park and Highway 10 Buffer Development	$1,096.16	n/a	$1,041,352.00
Library Materials	125.46	n/a	119,187.00
Police Protection	55.77	$223.02	53,650.56
Fire Protection	240.89	963.58	231,736.24
Total:	$1,518.28 per new unit/lot	$1,186.60 per acre	$1,445,925.80

Implementation of the NCP

1. **Amendments to the OCP and NCP**

Subject to Council approval of the West Newton/Highway 10 NCP, the OCP will need to be amended to reflect this new NCP. The necessary amendment is documented in Appendix II.

In keeping with the practice followed for other NCPs, OCP land use designation amendments required to implement the NCP Land Use Plan (e.g. from Suburban to Multiple Residential, Commercial or Urban) will be processed concurrently with site-specific rezoning applications.

Any amendments to the NCP that are proposed after the NCP is approved will be considered in accordance with the OCP policy on amendments to secondary plans.

2. **Zoning By-law Amendment for Amenity Contributions**

The Zoning By-law must be amended to add the West Newton/Highway 10 NCP to the list of NCPs within which amenity contributions are required. The proposed amendments to Schedules F and G of the Zoning By-law, to incorporate the amenity fees for West Newton/Highway 10, are documented in Appendix III.

3. **Form and Character of New Development**

The Plan area is an extension of the West Newton South neighbourhood. Much like the developed areas surrounding the Plan area, the primary land use in the Plan area is single-family residential use. To ensure compatibility between the new developments within the Plan area and the existing residential developments in the surrounding area, character guidelines are to be developed in conjunction with each development application and administered through the building scheme process, as is the case with all new single-family residential developments in the City. The design of commercial and multiple residential developments will also be required to be sensitive to the character of the surrounding uses. The design guidelines, as contained in the OCP, will apply to all development in the Plan area.

4. **Servicing, Financing and Phasing**

Servicing, financing and phasing plans have been prepared to support and allow reasonable implementation of the NCP and are described in a separate Corporate Report from the Engineering Department that will be forwarded to Council for consideration at the same meeting as this report will be considered.

CONCLUSION

Planned, as an expansion of the West Newton South neighbourhood, the West Newton/Highway 10 NCP responds to the planning objectives of the community and is in keeping with the OCP policies. The Plan has been developed in consultation with the property owners and stakeholders and is supported by a majority of the owners and residents of the area. Amenity contributions have been identified to fund the various amenity needs of the area. It is recommended that Council:

1. Approve the final and complete West Newton/Highway 10 NCP, as contained in Appendix I, as a means to manage development of the West Newton/Highway 10 neighbourhood and to provide services, amenities and facilities in support of the development of this neighbourhood;

2. Instruct the City Clerk to introduce a by-law to amend the OCP, as documented in Appendix II, to add the West Newton/Highway 10 NCP area to Figure 27, entitled "map Showing Recently Approved Secondary Plans";

3. Instruct the City Clerk to introduce a by-law to amend the Zoning By-law, as documented in Appendix III, to require amenity contributions for the West Newton/Highway 10 neighbourhood, based upon the density bonus concept;

4. Instruct staff to bring forward any necessary OCP land use designation amendments concurrently with the related site specific rezoning application in the West Newton/Highway 10 neighbourhood; and

5. Instruct the Parks, Recreation and Culture Department to prepare a plan to acquire and develop the landscaped buffer and multi-use pathway along Highway 10, as generally described in the West Newton/Highway 10 NCP and to develop a strategy to provide on-going maintenance of the buffer.

Murray Dinwoodie
General Manager
Planning and Development

BP:saw

Attachments

APPENDIX VI

COUNCIL RESOLUTION AND WEST NEWTON/HIGHWAY 10 NCP - SERVICING PLAN REPORT

REGULAR COUNCIL (SPECIAL) MINUTES
TUESDAY, JULY 28, 2004

Item No. C008 West Newton/Highway 10 Neighbourhood Concept Plan (NCP) Servicing Plan Report
File: 6250-20 (WN)

It was Moved by Councillor Higginbotham
Seconded by Councillor Tymoschuk
That Council adopt the engineering servicing and financial strategies as outlined in this report and as specified in West Newton/Highway 10 Master Servicing Plan as the means of providing engineering services for this neighbourhood.

RES.R04-2236 Carried

SURREY
CITY OF PARKS

Corporate Report

NO: C008

COUNCIL DATE: July 26, 2004

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**July 21, 2004**
FROM:	**General Manager, Engineering**	FILE:	**6520-20(WN)**
SUBJECT:	**West Newton/Highway 10 Neighbourhood Concept Plan (NCP) Servicing Plan Report**		

RECOMMENDATION

That Council adopt the engineering servicing and financial strategies as outlined in this report and as specified in West Newton/Highway 10 Master Servicing Plan as the means of providing engineering services for this neighbourhood.

INTENT

The purpose of this report is to provide Council with an overview of the engineering servicing and financial strategy for West Newton/Highway 10 Neighbourhood Concept Plan (NCP) Study Area and seek Council approval.

BACKGROUND

The Proposed Land Use Concept Plan for the West Newton/Highway 10 (Stage 2 NCP) Study Area is being presented for approval in a separate Corporate Report from the General Manager of the Planning & Development Department.

This Corporate Report outlines the engineering servicing issues and financial issues that are included in the Engineering Servicing Plan. As a result of the Stage 1 NCP Study, a number of engineering and financial issues were identified as needing resolution in the Stage 2 Study.

DISCUSSION

The Stage 2 Engineering Servicing Plan for the West Newton/Highway 10 Study Area is now available in the Engineering Department. This report includes engineering services layouts and analysis and a financial plan and analysis.

The engineering services discussed in the report relate to major infrastructure. Only those works which could be added to the 10-Year Plan and funded through Development Cost Charge (DCC) program, such as major trunk sewer and water grid mains, major collector and arterial roads and major stormwater management infrastructure (trunk storm sewer and major canal work) are discussed in detail in the report. Local site servicing requirements of individual developments were analyzed and considered in the report.

Transportation

The current City road network in this area easily accommodates the demand with very good levels of service at the intersections. Full development of the West Newton/Highway 10 NCP area will more than double the areas population. However, even with overall growth in and around the area, traffic volumes on the collector and arterial roads in this area are expected to remain relatively low.

Signalization and intersection improvements at 60 Avenue/128 Street and 60 Avenue/132 Street will be required by 2021 but additional through lanes will not be needed. In conjunction with the Highway 10 widening project, access from driveways and local roads will be eliminated or restricted to right-in/right-out only. 124A Street and 125 Street will be closed at Highway 10. Access to the Major Collector Roads (124 Street and 136 Street) from Highway No. 10 are planned as right-in/right-out/left-in only.

The Highway 10 Project Team has provided the City with the additional road allowance requirements in this area for their widening project. As outlined in the report from the Planning and Development Department, a 15-metre wide landscaped buffer area is proposed in the NCP along the north side of Highway 10. This will provide for a multi-use trail and buffering of the impacts of the Highway on the neighbourhood to the north of the Highway. Any future land use plan on the south side of Highway 10 should identify similar buffer areas along the Highway.

In keeping with the objective of a bicycle and pedestrian friendly City, improvements such as traffic calming, bicycle lanes and improved pedestrian crossings are proposed. Traffic calming/improved pedestrian crossings have been identified for 124 Street, 60

Avenue and local roads. Local and Collector road upgrading will be done in conjunction with development of the NCP. The arterial roads would be monitored and upgraded when warranted. Traffic calming on 124 Street/Boundary Drive would be initiated in the short term. Details of the proposed transportation network are shown in Figure 2.1.2 in Appendix I.

Drainage

The study area is divided into two major catchments, namely, Eugene Creek and Peacock Brook. The dividing line between the two catchment areas is along 128 Street north of 61 Ave and a little west of 128 Street to the south and shown in Figure 2.2.1 in Appendix I . The entire Panorama drainage area, which includes the Eugene Creek and Peacock Brook catchments, drains to the lowland to the Colebrook Pump Station and discharges into Mud Bay.

In order to accommodate the increased flows associated with the proposed higher density housing, additional capacity will be required for the storm trunk system. This involves the following key storm trunk additions/replacements: approximately 900 m of 750 mm to 900 mm storm trunk along the north side of Highway 10, 650/750 mm diameter storm trunk crossings under Highway 10, and 380 m of 600 mm diameter storm trunk along 128 Street south of Highway 10. In order to mitigate the impact of larger volumes of run-off into the lowlands, the Eugene Creek Tie-in Project must be completed. This project has been designed and budgeted but construction is pending some downstream right-of-ways, which to date, the City has been unable to acquire. Staff will review options to deal with this situation.

New storm sewers will be required along the local and collector roads to service the street and abutting lot drainage. These storm sewers will be funded and installed by developers.

Sanitary Sewer

All sanitary flows from the developing areas will be conveyed by gravity via a network of proposed 200 mm diameter pipes to existing and proposed 300 mm diameter trunk mains along the north side of Highway 10 as shown in Figure 2.3.1 in Appendix I.

The extension of 58B Avenue from 133B Street to 135 Street will require a sewer extension along Highway 10 from 132 Street in order to service the southern lots on the proposed south cul-de-sac. It may not be economic to develop these lots at the proposed density considering the high cost of the sanitary sewer required to service it. Pumped services may be considered.

As development proceeds and sanitary sewer lines are extended, existing residential pockets are expected to remove their septic fields and connect to the sewer. This would be accomplished through resident initiated local improvement projects.

Water

Many of the needed upgrades to the water distribution for this area are currently in the City's 10-Year Servicing Plan. Other key upgrades that will be necessary are:

- 450 mm diameter watermains along 128 Street and Hwy 10 east of 128 Street
- 250 mm watermain on 58B Avenue and Hwy 10 between 124A St and 128 Street
- 200 mm watermains along 58A Avenue, 131A Street, 135A Street, Hwy 10 (124 to 124A Street)

These improvements will create a looped network of 200 mm diameter watermains, which is necessary for adequate pressure for the centre of the study area as shown in Figure 2.4.1 in Appendix I..

Phasing

Most of the major infrastructure necessary to service the NCP currently exists, except for specific watermains, sanitary sewers and storm sewer upgrades along Highway 10. Local servicing must also be constructed as development proceeds.

Key major water feeder mains, storm trunks and Major Collector Roads will need to be added to the 10-Year Capital Plan to facilitate development of the area. DCC rebates may be utilized for developers that wish to accelerate the program by front ending major infrastructure costs.

Existing Local Improvement

A sewer local improvement extension (LIP) along 124A Street between 58A Avenue and 5977 - 124A Street was completed in 2001. Assignment of costs was on the basis of the zoning at the time, which meant that there will be no further subdivision potential on the east side of the street. The land use in the NCP report is being densified in this area and now allows for cluster housing (10 units per acre) for this part of the street. At the open house, one of the benefiting property owners in the LIP had requested for revisiting the original agreement. The cost-sharing scheme was based on the best information at the time of the LIP by-law adoption and a majority of the benefiting owners had agreed on the original cost-sharing scheme. The Legal Division has also confirmed that there is no requirement or mechanism under the Local Government Act to reopen the existing LIP agreements because it is impractical to re-compute each and every LIPs and secure agreements from the benefiting owners every time an unanticipated land use change occurs. Consequently the City will not recalculate the cost-sharing scheme for this LIP.

Alternate Road/Lot Layout

The Planning Department has developed two options land use and road/lot layout for the area bounded by 59 Avenue, Highway 10, 129 Street and 130 Street. However, it only affects the local servicing works constructed by developers. There would be no impact on the major engineering infrastructure.

Financing

A detailed financial analysis is included in the engineering servicing report available in the Engineering Department.

The following table summarizes the projected DCC revenues and construction costs for each engineering service at full build-out. The DCC revenues in this table are based on the current DCC rates.

Services	Projected DCC Revenues	Projected DCC Expenditures	Surplus/(Deficit) Balance
Sanitary Sewer	$709,686	$0	$709,686
Drainage	$1,933,654	$799,000	$1,134,654
Water	$801,346	$651,000	$150,346
Major Collector Rd	$1,165,778	$1,344,000	($179,000)
Arterial Road	$4,617,084	$1,261,000	$3,356,084

The above table demonstrates that the financial strategy for this NCP is in accordance with Council's policy respecting the developer-pay principle and requiring each NCP to be financially self-sufficient. DCC's are collected on a city wide basis not an NCP basis, thus while a considerable surplus is demonstrated in some services, these funds will offset shortfalls elsewhere in the City for these services.

CONCLUSION

The West Newton/Highway 10 Master Servicing Plan report provides a comprehensive servicing and financial plan for the area. The report demonstrates that this NCP will be self funding so that major servicing costs are not borne by the existing taxpayers. As a result of this NCP a number of additions to the 10-Year Plan will be made at the next update anticipated for the end of this year.

Paul Ham, P.Eng.
General Manager, Engineering

PH/VL/JB/rdd/kjj/brb
Attachments

APPENDIX VII

COUNCIL RESOLUTION AND WEST NEWTON/HIGHWAY 10 NCP STAGE I CORPORATE REPORT

REGULAR COUNCIL (LAND USE) MINUTES
MONDAY, JANUARY 26, 2004

1. At the January 12, 2004 Regular Council - Land Use meeting, Council tabled Corporate Report L018 to the next Regular Council - Land Use meeting.

Item No. L018 West Newton/Highway 10 Neighbourhood Concept Plan - Stage 1
File: 6520-20 (West Newton/Hwy 10)

The General Manager, Planning & Development submitted a report to:

1. Provide an overview of the Stage 1 component of the NCP for West Newton/Highway 10, including the process followed in preparing the plan, public consultation that was undertaken as part of the planning process and a description of the proposed Land Use Concept Plan;

2. Seek Council approval of the Stage 1 component of the NCP, including the proposed Land Use Concept Plan as the basis for more detailed planning necessary to complete the Stage 2 component of the plan; and

3. Provide Council with a summary of outstanding land use issues that will be addressed as part of the Stage 2 component.

Staff presented a brief presentation relative to the West Newton/Highway 10 Neighbourhood Concept Plan - Stage 1.

The General Manager of Planning & Development was recommending that the application be approved, subject to the conditions outlined in the report.

It was Moved by Councillor Higginbotham
Seconded by Councillor Hunt
That Council:

1. Receive this report as information;

2. Approve the proposed Stage 1 component of the Neighbourhood Concept Plan ("NCP") for West Newton/Highway 10, as described in this report and as illustrated in Appendix I;

3. Instruct staff to complete the Stage 2 component of the West Newton/Highway 10 NCP on the basis of the Stage 1 Land Use Concept Plan, including resolution of outstanding land use issues identified in Appendix VI, an engineering servicing strategy and a comprehensive financial plan that will provide adequate funding provisions for engineering servicing infrastructure, logical phasing, and community amenities; and

4. Authorize staff to proceed with processing of development applications in the West Newton/Highway 10 NCP area on the basis of conformity with the proposed Stage 1 Land Use Concept Plan (Appendix I), but that final approval of any such application be withheld pending completion of the Stage 2 component of the NCP.

RES.R04-151 Carried

SURREY
CITY OF PARKS

Corporate Report

NO: L018

COUNCIL DATE: January 26, 2004

REGULAR COUNCIL – LAND USE

TO:	**Mayor & Council**	DATE:	**July 22, 2004**
FROM:	**General Manager, Planning and Development**	FILE:	**6520-20 (West Newton/Hwy 10)**

SUBJECT: **West Newton/Highway 10 Neighbourhood Concept Plan - Stage 1**

RECOMMENDATION

It is recommended that Council:

1. Receive this report as information;

2. Approve the proposed Stage 1 component of the Neighbourhood Concept Plan ("NCP") for West Newton/Highway 10, as described in this report and as illustrated in Appendix I;

3. Instruct staff to complete the Stage 2 component of the West Newton/Highway 10 NCP on the basis of the Stage 1 Land Use Concept Plan, including resolution of outstanding land use issues identified in Appendix VI, an engineering servicing strategy and a comprehensive financial plan that will provide adequate funding provisions for engineering servicing infrastructure, logical phasing, and community amenities; and

4. Authorize staff to proceed with processing of development applications in the West Newton/Highway 10 NCP area on the basis of conformity with the proposed Stage 1 Land Use Concept Plan (Appendix I), but that final approval of any such

application be withheld pending completion of the Stage 2 component of the NCP.

INTENT

The purpose of this report is to:

1. Provide an overview of the Stage 1 component of the NCP for West Newton/Highway 10, including the process followed in preparing the plan, public consultation that was undertaken as part of the planning process and a description of the proposed Land Use Concept Plan;

2. Seek Council approval of the Stage 1 component of the NCP, including the proposed Land Use Concept Plan as the basis for more detailed planning necessary to complete the Stage 2 component of the plan; and

3. Provide Council with a summary of outstanding land use issues that will be addressed as part of the Stage 2 component.

BACKGROUND

At a Council-in-Committee meeting on February 4, 2002, Council received a delegation and petition from owners of property in the area bounded by Highway 10 to the south, 60 Avenue to the north, 128 Street to the west and 132 Street to the east in West Newton (Appendix II). Council was requested to initiate a neighbourhood planning process for this area. After hearing the delegation and considering the related petition, Council adopted the following resolution:

> "*That the Planning & Development Department consult with the neighbourhood regarding the preparation of a Local Area Plan for the area and report back to Council on the matter".*

At its Regular meeting on April 8, 2002, Council considered Corporate Report No. R068 (attached as Appendix III) and authorized the Planning and Development Department to proceed with a planning process to prepare an NCP and approved the Terms of Reference for such a process. Staff was also requested to investigate possible locations for institutional uses (not just public schools) in the plan area and to consider a Suburban land use option for properties adjacent to Highway 10, to achieve an appropriate suburban interface.

DISCUSSION

Planning Process

Plan Area and Study Area

The West Newton/Highway 10 Concept Plan Area and larger study area are illustrated in Appendix II. The plan area includes the Suburban designated lands identified in the original petition. These lands are bounded by 132 Street, 128 Street, 60 Avenue and Highway 10. In addition, a larger zone of influence was identified to achieve land use compatibility in the general area to allow for coordinated planning with surrounding areas and to assist in ensuring that the owners of potentially affected properties are included in the public consultation process, related to the development of the plan.

Planning Approach

The lands within the plan area represent the last remaining pocket of Suburban-designated land north of Highway 10 in the West Newton area and form a logical extension to the Urban-designated area to the north.

The plan preparation process was initiated by way of a petition from a majority of property owners in the plan area. Planning and Development Department staff prepared the Stage 1 component of the NCP in-house, with the assistance of an Engineering consultant (Urban Systems Ltd.) under the direction of the Engineering Department.

Parks, Recreation & Culture Department staff and School District staff have also been involved throughout the planning process. Similarly, external agencies, including the Ministry of Transportation, BC Hydro, Fire Department, Library Board and the Department of Fisheries and Oceans, have been consulted through the planning process.

Public Consultation

Public consultation was a key component of the planning process as is the case with every NCP prepared by the City. Four public open houses were held between June 2002 and November 2003. These open houses generated substantial feedback at key milestones in the planning process. Questionnaire surveys were conducted at each meeting to solicit specific comments from those attending the open houses on components of the plan. All of the information presented to the public at these open houses, as well as a synopsis of the results of the survey questionnaires was made available to the public by a variety of means, including the Surrey web page. Public input to the plan was also received by way of written submissions from individual property owners and through meetings with many individuals and resident groups. Staff answered individual queries related to the plan by telephone or through the Surrey web

page. All public input was reviewed and carefully considered in preparing the plan that is being presented to Council as part of this report.

A summary of the results of the Open Houses is contained in Appendix VIII.

In addition, a Citizens Advisory Committee, comprised of representatives of the owners of properties in the plan area, was established at the outset of the planning process and met on a regular basis with City staff to provide advice and comments on issues that arose through the planning process.

Proposed Land Use Concept Plan

Planning Goals and Objectives

On the basis of public input, a set of planning goals and objectives was formulated to guide the preparation of the West Newton/Highway 10 Concept Plan. These goals and objectives are:

1. To develop and formulate land use and other development policies to guide development proposals in the plan area;

2. To encourage sustainability and develop a plan which enhances quality of life;

3. To identify and enhance environmentally sensitive areas, such as significant vegetation;

4. To prepare a parallel servicing strategy that identifies the appropriate location, staging and standard of services required to support the land use plan, including sanitary sewer, water, drainage, roads and other utilities and methods of implementation by rezoning, subdivision, or other mechanisms;

5. To undertake a financial analysis that will demonstrate adequate funding for the implementation of the servicing plan;

6. To ensure compatible interfacing and provide buffers to achieve appropriate density and land use transitions with the existing neighbourhood;

7. To develop an appropriate landscape buffer and maintain the Suburban character along Highway 10;

8. To complete proper planning and secure financial commitments through the development approval process to achieve an appropriate level of community services and amenities, including schools, parks, fire, police and library services to serve this community; and

9. To ensure adequate and meaningful public consultation in the planning process.

Planning Opportunities and Constraints

The following planning opportunities were identified:

1. The BC Hydro Corridor provides public recreational opportunities, including the continuation of the Serpentine Greenway;

2. Highway 10 is a major regional transportation corridor that offers the potential to establish landscape buffers, to accommodate public greenways and to provide a barrier for sites south of Highway 10 (Panorama Ridge);

3. Availability of large and relatively self-contained properties within the plan area provides opportunities for the efficient development of land and installation of services;

4. Potential to preserve existing natural vegetation and significant stands of trees;

5. Potential to provide and upgrade infrastructure, services and community amenities (Police, Fire protection, Library services) through development amenity contributions;

6. Potential for increased park and open space resources;

7. Potential to explore opportunities for institutional uses in the plan area; and

8. Opportunity to integrate the area with the adjacent West Newton South Neighbourhood Concept Plan.

Alternatively, development in the area is subject to the following planning constraints that need to be addressed:

1. Existing pockets of development will require adequate interface treatment to ensure a sensitive integration of new development while minimizing impacts;

2. Highway 10 is a major regional transportation route, that presents significant challenges in terms of accommodating the regional transportation function, having access restrictions to individual properties and requiring a reduction in the number of road access points to the highway and the need for establishing landscape buffers to protect adjacent development;

3. Limitations on development are presented by the BC Hydro corridor, which traverses the plan area within which the development of permanent structures is prohibited and which requires building separation along the corridor;

4. School capacities will be reviewed with the Surrey School District to ensure adequate long-term availability of school resources;

5. Lack of services and costs of providing services in the area must be addressed;

6. The existing road network, including established road patterns, traffic controls, and hierarchy will affect the type, orientation and density of development in the NCP; and

7. Permanent Suburban areas should be maintained along Highway 10 to preserve the existing rural character.

Overview of the Proposed Land Use Concept Plan (Stage 1)

1. ***Proposed Land Use Plan (Appendix I)***

The Proposed Land Use Concept is illustrated in Appendix I. Single-family residential land uses are the most dominant land use in the plan, but are included with a variety of densities ranging from Suburban transition lots (along the west side of 126A Street) to conventional single-family lots (6 units per acre) and small lots at various densities (10 to 13 units per acre, with or without lane access). New residential subdivisions will be designed to blend into the surrounding neighbourhood pattern.

The land use plan also features a variety of multi-family residential uses, including townhouses (20 units per acre), seniors housing (20 units per acre) and sites designated for seniors townhouses and a care facility or nursing home. In addition, the plan proposes two local commercial nodes, and three neighbourhood parks to serve this community. Details on these proposed open space and commercial uses are provided below.

The Proposed Land Use Concept provides transitions between new and existing development through appropriate densities and uses along these interface areas, and/or the establishment of landscape buffers.

It is estimated that the Proposed Land Use Concept Plan will generate an additional 950 residential dwelling units and will accommodate an additional population of approximately 2,880 people, bringing the total population of this community at full build-out to between 4,200 to 4,500 people. A summary of the

proposed land uses, including total number of dwelling units and projected population, is documented on Appendix IV.

2. Open Space, Tree Preservation, Greenways, and Highway 10 Buffer

Parks and Open Space

The Proposed Land Use Concept Plan proposes three new neighbourhood parks, with a total area of approximately 5 ha (16 acres) as follows:

- Park (A), adjacent to J.T. Brown Elementary School, will have an area of approximately 2 ha (5 acres) and is proposed to function as a passive park with substantial tree preservation;

- Park (B), immediately south of Panorama Park Elementary School, will have an area of approximately 1.2 ha (3 acres) and is proposed to provide active playfields; and

- Park (C), a community park, will have an area of approximately 3 ha (7.5 acres) and will function as an active park, including playfields and a children's playground.

The plan area does not contain any unique sensitive areas or protected watercourses.

Tree Retention and Management Strategy

A preliminary area-wide tree assessment has been conducted to identify possible areas for tree retention. While the central part of the Concept Plan area (petition area) is well treed, this area as a whole is not considered a viable tree retention area due to the high risk of tree failure. The trees in this area are within a dense, closed stand of vegetation and have been growing in a sheltered, group state. As a result, any encroachments on this vegetation will alter drainage regimes and create sun and wind exposure, creating potentially hazardous conditions in the immediate and longer term. As a result, this stand will be highly vulnerable to failure and wind shearing, resulting in an unreasonably high risk to human safety if allowed to remain through the land development process.

The proposed tree management strategy advocates a combination of selective tree preservation and tree replacement, to balance environmental objectives and adequately protect the public from hazards associated with tree failure. Tree preservation areas have been identified within the proposed Park (A), along the east side of 128 Street south of 60 Avenue, on sites designated for townhouses and within the landscape buffer/greenway proposed along Highway 10. These

will be augmented by tree planting in parks, greenways, boulevards and on private lots. More detailed arborist assessments will be required at the time of development of individual sites to determine the extent to which viable tree retention may be possible and to establish appropriate tree management and planting plans.

Greenways and Highway 10 Landscape Buffer

The Serpentine Greenway traverses the area along the BC Hydro corridor. The City, as part of a long-term acquisition strategy, has already acquired some of the land within the BC Hydro corridor for this greenway, which functions as a multi-use, recreational corridor connecting the neighbourhoods in Newton to the Serpentine River. The Proposed Land Use Concept recognizes this initiative and will ensure completion of this important amenity and the integration of the adjacent land uses in support of the Greenway.

A 15m wide landscape buffer is proposed to be acquired along the north side of Highway 10 when development occurs, to achieve a multi-use pedestrian greenway along the highway, to provide a physical separation for development from the highway and to maintain a landscaped, suburban edge along the highway. The buffer will also provide the potential for tree preservation and replanting. Details regarding the design of the proposed buffer are provided in Appendix VII. As is standard practice, the buffer area will be protected by a restrictive covenant or public right-of-way on private property, as a condition of development of the sites adjacent to Highway 10. Securities will be held by the City to ensure the buffer/greenway is completed by the individual developments to City standards. In cases where the buffer cannot be acquired (on properties where development is not anticipated) sidewalks on Highway 10 will be constructed to maintain continuity along the highway.

3. ***Transportation and Road Concept***

The Concept Plan area is bounded on the south by Highway 10, a Provincial highway and is traversed by two major Arterial Roads (128 Street and 132 Street), a major collector road (60 Avenue) and an existing network of local roads. The proposed road network recognizes the existing pattern and hierarchy of roads and proposes a system of local roads and transportation improvements to provide a transportation system that will support the proposed land uses and projected population at build out. Some of the key components of the transportation plan are:

- Proposed traffic signals on 60 Avenue at 128 Street and at 132 Street;
- Road widening along 60 Avenue through the plan area plus bicycle lanes and one-side parking;

- Closures of 124A Street and 125 Street at Highway 10;

- Widening of Highway 10 to four lanes;

- Pedestrian crossing improvements on 60 Avenue and 128 Street, including curb extensions, median islands and pedestrian-activated signals; and

- Traffic Circles on 124A Street at 60 Avenue and Boundary Drive to address concerns from residents related to speeding and shortcutting and to minimize conflicts with pedestrians, cyclists and other motorists.

Pedestrian Network

The proposed pedestrian network has been designed to provide a safe, accessible and pedestrian-friendly network by way of sidewalks and walkways connecting the residential areas with the proposed park system (parks and greenway) and with the commercial areas and points beyond the plan area. A key component of this strategy involves the requirement for lane access to small residential lots (13 units per acre) fronting 60 Avenue and all proposed new local roads in the central plan area with the exception of new lots backing on to Highway 10. This will assist in providing public sidewalks that are not interrupted by driveways.

Highway 10 Widening

Improvements to Highway 10 have been initiated under the Border Infrastructure Program, a joint Provincial and Federal initiative presently under way. Representatives from the Ministry of Transportation (MoT) and the Highway 10 Project Team have been involved as stakeholders in the development of the proposed Land Use Concept. In addition, representatives from the Highway 10 Project Team have met with community groups in the area to discuss issues related to the possible widening of Highway 10. A Highway 10 Project community office has been established in Cloverdale to provide on-going information to the public and obtain input on this highway widening initiative.

Feasibility studies on the proposed Highway 10 road design, possible need for road widening, property acquisition, noise abatement and access restrictions are under way, but these will not be finalized until early 2004. City staff will continue to work closely with the Highway 10 Project Team to incorporate final recommendations for the Highway 10 design into the Stage 2 component of the NCP.

4. ***Commercial Uses***

Another component of the proposed Land Use Concept is the provision of an adequate level of and accessibility to, commercial services within the immediate area to serve the new population and to minimize the need to drive for regular daily commercial services. The following commercial services are proposed in the Land Use Plan:

- An expansion of the existing commercial node at the northeast corner of 128 Street and Highway 10, which contains a gas station and associated convenience store, is proposed. A total site area of approximately 1.0 ha (2.5 acres) has been designated for this commercial expansion to allow for the anticipated Highway 10 widening, future redevelopment of the existing gas station and the addition of neighbourhood commercial uses (based on the C-4 or C-5 Zones) to serve the projected NCP population; and

- A second, smaller neighbourhood commercial node is proposed at the northwest corner of 132 Street and Highway 10 to provide commercial services for the immediate area. This site is presently under a development application (7901-0277-00), which is on hold pending completion of this Concept Plan. As requested by the public and the Community Advisory Committee, restrictions are needed for the type of commercial uses proposed at this site to address concerns related to traffic impact and neighbourhood compatibility. A clear indication was given that the site should be focused on the neighbourhood and should not be developed with specific uses, such as a gas station, neighbourhood pub or 24-hour convenience store. These use limitations will be imposed, subject to further public input, as part of the development application review and approval process for this site.

5. ***Schools***

Surrey School District representatives have been consulted throughout the Concept Plan preparation process to ensure the future demands for schools from this area are adequately addressed. Comments from the Surrey School District regarding future school needs related to this neighbourhood are provided in Appendix V.

The Concept Plan area is located across three different elementary school catchment areas:

- J.T. Brown (west of 128 Street);
- Panorama Park (between 128 Street and 132 Street); and
- North Ridge (east of 132 Street).

The School District advises that a new elementary school is not required, as the additional students generated by growth in the NCP will be accommodated within the existing schools. North Ridge Elementary is expected to grow by only 15 students. However, significant student growth is anticipated at both Panorama Park (200 students) and JT Brown (65 students). Both of these schools are presently at or near capacity. To address the expected capacity needs, expansions to both schools will likely be required. Catchment boundaries for the elementary schools may also need to be adjusted.

The Concept Plan area is served by Tamanawis Secondary School, which presently is over capacity and has several portables. The NCP is expected to generate 200 high school students. A new secondary school has been approved at the Traditional School site (Newton Area Secondary) and will be in operation in 2006 to accommodate the increased enrolment generated by the Concept Plan area.

6. ***Institutional Uses***

The Plan area and surrounding area is presently served by numerous private and public institutional uses, including four public schools, a fire hall, and four churches. In addition, a seniors care facility is proposed at the northeast corner of 132 Street and Highway 10 to provide intermediate or extended care housing for aging residents in this community.

In response to Council's request that staff investigate possible locations for institutional uses within the plan area, discussions were held with the public at the initial open houses and with the Citizens Advisory Committee, regarding the inclusion of additional institutional uses in this area. Strong opposition was expressed in this regard due to the number of existing public and private institutional uses already in the area. Feedback generally included statements that such uses are intrusive and generate significant community impacts, such as traffic and noise with minimal local benefit and that by identifying specific sites for institutional use unduly limits the potential development of these properties. The policies contained within the Official Community Plan allow for institutional uses to be located in most land use designations. On this basis, the plan does not identify any specific sites for institutional uses.

Outstanding Land Use Issues

A number of land use concerns were identified by property owners in the questionnaires submitted following the most recent Open House. A summary of these outstanding concerns is contained in Appendix VI. A detailed assessment of these concerns will be conducted as part of Stage 2. Any resulting changes to the Land Use Plan will be presented to Council in conjunction with the Stage 2 component of the NCP.

Planning Analysis

The proposed Land Use Concept Plan for the West Newton/Highway 10 Concept Plan area is consistent with the planning goals and objectives identified for this community as part of the planning process and has substantial support from the residents/property owners in the Plan area. The following is synopsis of the planning rationale for the Stage 1 component of the NCP as recommended to Council:

1. Official Community Plan

A Concept Plan should reflect the policy directions of the Official Community Plan ("OCP"). The Proposed Land Use Concept Plan (Stage 1) contributes to the overall community framework, as established by Council in the OCP in the following areas:

Encourages growth and development that effectively utilizes land and City resources, creating new opportunities to grow in ways that can enhance our neighbourhoods;

Creates orderly and cost-effective development by promoting a complete urban community, ensuring strategic capital investments to support the community and ensures stakeholder participation and support in local land use planning;

Supports a compact urban development pattern and creates an identifiable neighbourhood by ensuring proper planning for schools, parks and stores;

Provides a balanced range of choices in the type, tenure and cost of housing;

Creates a safe, attractive and people-friendly environment through the promotion of CPTED principles, thus enhancing the City's image; and

Locates services and facilities close to residential neighbourhoods to create multi-purpose centres and minimize travel to larger commercial areas.

2. Concept Plan Objectives

The proposed Land Use Concept achieves the planning objectives identified for this Concept Plan. The proposed plan will effectively integrate with the surrounding land use context and the adjacent NCP area (West Newton-South Neighbourhood). The new residential developments will be reasonably served by commercial development, schools, park resources and other amenities.

Substantial public consultation has been undertaken throughout the planning process, including internal and external stakeholder sessions, Citizen Advisory Committee meetings and several public open houses. The proposed Stage 1 Land Use Concept responds to the aspirations of the majority of residents and property owners, in terms of land use, density and area character.

General Servicing Issues

The Stage 1 servicing plan report has been completed for the area. Maps for the transportation, sewer, water and storm services are contained in Appendix IX. The Engineering Department staff is satisfied that the servicing concepts, as proposed for transportation, water, sanitary sewer and storm drainage, will support the proposed land use plan.

The detailed work required to finalize the servicing strategies will be undertaken as part of the Stage 2 component of the NCP. Upon completion of this engineering analysis, a financial plan will be developed to identify how the engineering services will be funded. The financial plan will identify the costs for each component of infrastructure and the anticipated Development Cost Charge ("DCC") revenues for that component, to demonstrate a balance. At this time, the Engineering Department is projecting that DCC revenues generated by new development in the area will be sufficient to fund engineering infrastructure needed to support the new development.

The following specific issues that will be addressed in the Stage 2 component of the NCP:

1. ***Transportation***

- Specific land requirements for widening Highway 10 as part of the Provincial Ministry of Transportation Highway 10 improvements will likely be available next year for inclusion in the Stage 2 Report;
- Further alternatives for traffic calming in the area will be examined; and
- The closure of 124A Street and 125 Street at Highway 10 will be confirmed.

2. ***Water***

The phasing of water system improvements must be addressed to ensure a reliable water supply as the area develops.

3. ***Sanitary Sewer***

The servicing of the eastern portion of 58B Avenue, between 133B Street and 135 Street, will be expensive for the developers of the single family residential land use in this area. This issue will be studied in more detail to determine if less expensive alternatives are available.

4. ***Storm water***

Detailed analysis of the storm sewer on 128 Street and 57 Avenue will be conducted to confirm capacities.

Financial Analysis

A financial plan and phasing strategy will be completed as part of the Stage 2 component. Due to the infill nature of this land use plan, the majority of improvements in the plan area must be borne by the developers of the neighbourhood. Some minor refinements and additions to the City's 10 Year Servicing Plan may be necessary.

The details associated with the engineering servicing strategies, the costs related to the design and construction of these works and the best method for the NCP to finance the infrastructure will be addressed as part of the Stage 2 component of the NCP.

Next Steps

It is recommended that Council authorize staff to proceed to developing the Stage 2 component of the NCP involving more detailed planning and analysis as follows:

1. Resolution of the outstanding land use concerns, as documented above;

2. Identification of detailed engineering servicing requirements including water, sanitary sewer, storm sewer, drainage facilities, other major utility infrastructure and the road network;

3. Preparation of a comprehensive servicing plan which will provide solutions to servicing, transportation and other servicing issues;

4. Determination of a funding strategy to fund the infrastructure needed to support development in the area in accordance with City policy;

5. Development of a phasing plan for the logical development of the area; and

6. Completion of a review of required amenities to serve this area, including park acquisition analysis, park development costs, fire and police protection and library materials and the establishing of appropriate amenity contributions for the NCP area to be collected at the time of development of individual sites.

Various City Departments and external agencies will continue to be consulted during the development of the Stage 2 component of the Concept Plan. The complete servicing, phasing and financial plan will be presented to the public for review and comment before it is submitted to Council for consideration of approval. It is anticipated that the Stage 2 component of the NCP for West Newton/Highway 10 will be completed by Spring, 2004.

If Council adopts the Stage 1 component of the NCP, as recommended, in keeping with past practice, it is further recommended that staff be authorized to receive and process development applications for sites within the NCP, provided that final application approval will be held pending completion of the Final Stage 2 component of the NCP, as described above.

CONCLUSION

It is recommended that Council:

1. Approve the proposed Stage 1 component of the NCP for West Newton/Highway 10, as described in this report and as illustrated in Appendix I;

2. Instruct staff to complete the Stage 2 component of the West Newton/Highway 10 NCP on the basis of the Stage 1 Land Use Concept Plan, including resolution of outstanding land use issues identified in Appendix VI, an engineering servicing strategy and a comprehensive financial plan that will provide adequate funding provisions for engineering servicing infrastructure, logical phasing and community amenities; and

3. Authorize staff to proceed with receiving and processing development applications in the West Newton/Highway 10 NCP area on the basis of conformity with the proposed Stage 1 Land Use Concept Plan (Appendix I), but that final approval for these applications be withheld pending completion and approval by Council of the Stage 2 component of the NCP.

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RCA/rdd/saw
Appendices