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CORPORATE REPORT

NO: R014 COUNCIL DATE: **January 16, 2017**

REGULAR COUNCIL

TO:	**Mayor & Council**	DATE:	**January 12, 2017**
FROM:	**General Manager, Planning & Development**	FILE:	**6520-20 (Surrey City Centre)**
SUBJECT:	**Surrey City Centre Stage 2 Final Plan**		

RECOMMENDATIONS

The Planning & Development Department recommends that Council:

1. Receive this report as information;

2. Approve the final and complete City Centre Plan, as attached in Appendix "I";

3. Approve the amenity contributions specified in the City Centre Plan, for supporting the development and provision of services, amenities, facilities, and undergrounding of electrical, telephone, cable, and internet utilities for City Centre;

4. Authorize the City Clerk to introduce the necessary bylaws to amend *Surrey Zoning By-law, 1993, No. 12000* ("Zoning By-law"), as documented in Appendices "II" and "III", and to set a date for the related public hearing; and

5. Approve revisions to Policy O-48 as shown in Appendix "IV", to allow a maximum of 0.75 square metres [8 sq. ft.] per dwelling unit of the required outdoor amenity space to be provided as public outdoor space, as part of development in City Centre.

INTENT

The purpose of this report is to seek Council approval for the final and complete City Centre Land Use Plan ("Plan"), including the Urban Design Guidelines, Neighbourhoods and Districts, Park and Open Space Concept, Finer-grained Road Concept, and associated amenity contributions. A report, under separate cover, from the Engineering Department describes the servicing and infrastructure funding arrangements associated with the development concept contained in this report.

BACKGROUND

Surrey's City Centre is located in North Surrey and is approximately 540 hectares (1,300 acres) in size. The Plan area is generally rectangular in shape, bound by 112 Avenue to the north, 94A Avenue to the south, 132 Street to the west, and 140 Street to the east. King George Boulevard runs through its centre. Situated at the heart of the region, Surrey's City Centre area is designated

as the region's second metropolitan centre in the Metro Vancouver 2040 Regional Growth Strategy.

Context and Plan History

The first plan for the City Centre was completed in 1991, coordinated by Ray Spaxman in consultation with City staff. Key recommendations of the 1991 plan included concentration of density at the SkyTrain stations, construction of a ring road system, and implementation of urban design and streetscape features. This work was supplemented with the Whalley Enhancement Strategy and Urban Design Concept in 2003.

Development after the adoption of the 1991 plan ranged between almost no activity, to periods of intense activity which was not always concentrated at or near the SkyTrain stations, as was intended in the 1991 plan. The resulting development pattern did not create a complete and identifiable City Centre.

In order to redefine the vision and establish and reinforce a desirable development pattern for the downtown, an updated City Centre Plan was needed. On July 24, 2006, in Corporate Report R172; 2006, Council authorized the Terms of Reference to proceed with an update to the 1991 Surrey City Centre Plan.

The Plan update was proposed in three phases:

- Phase One: Analyzing Conditions
- Phase Two: Stage 1, Developing the Plan
- Phase Three: Stage 2, Implementing the Plan

Phase One

Phase One involved background research, analyzing the past and existing conditions, and gathering public feedback.

- On October 30, 2006, Council received Corporate Report No. C020; 2006, which provided an update of the background research, and authorized staff to proceed with an "Ideas Fair".

- On April 30, 2007, Council received Corporate Report No. C006; 2007, which summarized the results of Phase One. In addition to the analysis of existing conditions, this phase initiated a dialogue with stakeholders in the study area and defined key issues that stakeholders identified as being important to address by the Plan update.

- In June 2007, Bing Thom Architects was engaged to provide land use and urban design consulting services for the Plan update.

- The Surrey Central Transit Village Plan (which was initiated in 2004 under the Transport Canada Urban Transportation Showcase Program) was also underway. This study examined the area immediately around the Surrey Central SkyTrain station. The intent of the plan was to create a land use and transportation plan that reduced greenhouse gases through focussing high density mixed use development around the Surrey Central SkyTrain station, with a fine-grained pedestrian-friendly street network.

- A key recommendation of the Surrey Transit Village Plan proposed relocation of the existing bus loop to a transit couplet, which is a system of two parallel streets with pick up and drop off on city streets that are lined with active retail and public uses. The land occupied by the bus loop was proposed to be redeveloped with high density uses to bring vibrancy to the area. These recommendations were incorporated into Phase One of Surrey City Centre Plan update process.

Phase Two – Stage 1 Plan

The second phase of the plan update involved generating several land use options and receiving public feedback on these options. The following reports were provided to Council:

- On July 28, 2008, through Corporate Report No. R159; 2008, Council approved the initiation of public open houses and meetings with a Citizen's Advisory Committee, landowners, developers, and other stakeholders, in order to receive public input on Phase One findings and proposed land use options.

- On February 9, 2009, Council received Corporate Report No. C001; 2009, and approved finalization of the second phase of the plan update with the City Centre Stage 1 Land Use Plan, which included the Land Use and Density Concept, the Basic Road Network, the Road Width Concept, the Parks and Open Space Concept, and the Interim Implementation Strategy. These plans provided the basis for reviewing and approving development applications.

Phase Three – Stage 2 Plan

The final phase of the City Centre Plan update involved undertaking additional background studies, including a 3-D Modeling Study to inform the Urban Design Guidelines and Building Heights Concept; a Green Network Study to further develop the Parks and Open Space Concept; a Heritage Study to help supplement the neighbourhoods and placemaking work; the development of City Centre Road Standards; and a detailed servicing and financial strategy.

Several status reports were provided to Council during the final phase of the plan update as follows:

- On July 25, 2011 Council considered Corporate Report No. R151; 2011, and approved the recommendations in the report related to an updated Land Use and Density Concept, a new Building Heights Concept, updated neighbourhood park areas, a Road Network Plan Concept, and Green Lanes.

- On May 28, 2012, Council considered Corporate Report No. R114; 2012. This report provided information on the outcome of a community consultation process and programs to activate public spaces through the installation of temporary mini-urban parks and food carts.

- On July 17, 2013, Council received an update on the City Centre Plan in Corporate Report No. R155; 2013, and approved recommendations on additional parks, an expanded area for the mixed use designation, and refinements to the Road Network Concept.

This report presents the final and completed work for Stage 2 of the City Centre Plan Update that includes a finalized Land Use and Density Concept, Urban Design Guidelines, Neighbourhoods

and Districts Concept, Parks and Open Space Concept, Finer-grained Road Network, and associated Zoning By-law amendments.

Public and Stakeholder Engagement and Consultation

During Stage 1 of the City Centre Plan Update, consultation included an Ideas Fair, Public Open Houses, and meetings with the Downtown Business Improvement Association, resident groups, City Advisory Committees, and other stakeholder groups.

Extensive consultation and engagement continued during Stage 2, using various public outreach methods. A detailed list is provided in Appendix "V". The Stage 2 engagement process consisted of the following:

- Focus Groups, Surveys and Interviews
- Public Open Houses and Stakeholder Meetings
- Meetings with Business and Development Community Meetings
- Presentations at Council Advisory Committees
- Design and Visioning Workshops
- Community Festivals and Forums
- Walking Tours

DISCUSSION

The goal of the Surrey City Centre Plan is to help develop and support a regional downtown that is the main business, cultural and activity centre for the City of Surrey. It is anticipated that the existing City Centre population of 32,000 will more than double by 2033 to approximately 68,000 people and the number of jobs will increase from 24,000 to 32,000 over the next 10 years.

As population and employment increases, a plan to support the evolution of City Centre as a downtown that is attractive, safe, vibrant and successful is fundamental. The following outlines the main components of the City Centre Plan.

City Centre Vision

Surrey's City Centre is undergoing a major transformation from a suburban centre into a walkable high density, transit-oriented downtown for South of the Fraser. These changes have been driven by a clear vision for the area.

Surrey City Centre is envisioned to be the Fraser Valley's metropolitan centre, connected to major regional destinations by rapid transit and an efficient road network designed to support walking, cycling, and transit. It will be a centre for major employment; services; higher-density housing; and commercial, cultural, entertainment, and institutional activity. City Centre will be home to a diverse population, including new immigrants and established residents; young professionals; families and children; youth; and seniors.

Distinct and vibrant neighbourhoods, including a dynamic and innovative business sector, university, hospital, and civic and historic districts, will form the framework of the City Centre. Each of these areas will have its own unique character that together will create a diverse, authentic, and interesting downtown.

The downtown will be known for its green urban infrastructure of parks, plazas, greenways, planted boulevards, and rain gardens, as well as for its existing natural features that include fish bearing creeks, riparian areas, and spectacular views to the North Shore and North Cascade Mountains.

Guiding Principles

The challenge for Surrey's downtown is to move from a post-war suburban built form into one that is more urban in nature. Components of an urban downtown include: smaller block sizes; vibrant streetscapes; concentration of office employment; active retail uses; higher densities to support transit, cycling, and walking; a range of cultural, entertainment, and shopping uses; and a high quality architectural design, with public realm for parks, plazas, and public art.

To realize the vision for City Centre, a set of eight guiding principles have been developed:

1. **Build Density and Mixed Use**
   Building higher residential and employment densities close to transit will create a City Centre that is more vibrant and livable, as well as one that thrives economically. These areas provide residents of high density housing easy access to urban amenities, shopping, entertainment, education, and employment. The close proximity to amenities will support higher levels of walking, cycling, and transit use.

2. **Encourage Housing Diversity and Tenure**
   Thriving downtowns are home to diverse populations with housing to support that diversity. Surrey's City Centre plan will provide a wide range of housing types and tenures for all ages, incomes, and household compositions. The diversity will help accommodate housing choices for families, students, seniors, working professionals, and vulnerable populations.

3. **Break Up the Block Size**
   A pattern of interconnected streets with small blocks will support walking and cycling as the most convenient ways to get around the City Centre. It provides a variety of routes that enable pedestrians and cyclists to choose the most direct and comfortable routes to conveniently reach amenities in the neighbourhood.

4. **Design Roads for Multiple Modes**
   Multi-modal streets will be designed as 'complete streets' in the City Centre. They will move pedestrians, bicycles, transit, and motorists.

5. **Create Vibrant Urban Spaces**
   A high quality public realm with continuous active streetscapes, public art, urban amenities, and cultural activities and facilities all contribute to the vibrancy of the downtown. These elements will bring vitality to the higher density uses planned for the City Centre.

6. **Promote Identity and Sense of Place**
   Urban downtowns tend to be interesting and memorable because they are typically walkable, diverse, and have unique character and identity. City Centre has been organized into unique neighbourhoods and districts each with its own identity and elements that create a unique sense of place.

7. **Encourage Office and Employment**
   A key factor that makes a downtown special is its economic significance. The City Centre will have a larger concentration of the office, active retail, and other employment uses than any other area of the city.

8. **Green the Downtown**
   Access to natural and recreational space is one of the key defining elements that will contribute to livability in the urban setting of City Centre. These areas, either natural or human-made, will provide relief from urban density by softening the urban hardscape.

Density and Uses

The following describes the land uses proposed for the City Centre. Appendix "VI" summarizes the amount of land allocated within the plan for the different land uses, and the estimated number of dwelling units, population, and potential floor area at full build-out of the plan.

Residential Uses

The plan proposes a full range of residential forms and densities. High-rise and mid-rise buildings at densities between 3.5 and 5.5 floor area ratio (FAR) will support the employment and commercial areas as well as increased transit use. Mid-rise apartment buildings and townhouses with densities up to 2.5 FAR will provide housing for a range of household types, and will form a suitable transition between taller building forms at the centre of the plan and smaller ones at the periphery. Two single family areas will be preserved to further provide additional opportunities for families to locate close to the downtown.

- <u>High-rise (5.5 FAR) Areas</u>

  This designation allows a gross density of 5.5 FAR in the form of high-rise apartment buildings located within five minute walking distance to the SkyTrain nodes.

- <u>Mid-rise (3.5 FAR) Areas</u>

  Mid-rise towers will serve as a transitional area between higher densities and lower densities. The development site can have a mix of building forms including mid-rise and high-rise, with an overall gross site density of 3.5 FAR.

- <u>Low-rise Apartment and Townhouse (2.5 FAR) Areas</u>

  The designation allows for gross density up to 2.5 FAR in the form of medium to low density townhouses and four to six storey apartments. Located along the perimeter of the plan, this designation will provide a transition between the proposed mid-rise areas and single family along outer boundary of the plan.

- <u>Single Family Areas</u>

  Two areas are proposed to largely remain single family neighbourhoods to allow families to live close to the downtown, and to provide diversity of housing choice. These areas are located at northeast corner of Bolivar Heights Neighbourhood, and south west of Holland Park. Gentle infill will be permitted for larger sized single family sites, as well as for sites

along key arterial roads where road widening is needed. Small lots, duplexes, and quad-plexes may be supported along 96 Avenue, portions of 134 Street, and 112 Avenue.

Mixed Uses

The City Centre Plan proposes mixed use areas that allow for a combination of residential, commercial, civic, institutional, and recreational uses. High density, mixed use designations are proposed along frequent transit corridors and station areas. Major civic, office, and institutional mixed uses (including City Hall, City Centre Library, and Simon Fraser University) are currently located within the Surrey Central SkyTrain Station node. Two secondary office employment nodes are located at Gateway Station to the north, and at the Surrey Memorial Hospital area to the south end of the plan. Commercial mixed use corridors are proposed along King George Boulevard and 104 Avenue.

- Mixed Use 7.5 and 5.5 FAR Areas

  Development in these areas will take place in the form of comprehensive developments comprised of numerous buildings that may be either multi-use developments with stand-alone offices, institutional or residential on the same site, or they may be mixed-use developments with a combination of office, institutional, and residential uses in one building. Uses on the ground floor of buildings will vary depending on the location, but will largely require active ground floor uses.

- Mixed Use 3.5 FAR Areas

  Medium mixed use densities are location along King George Boulevard, 104 Avenue, and the southern area of the plan, referred to as the Innovation District. The 104 Avenue and King George Boulevard corridors are envisioned as key retail corridors, with small scale retail along the northern portion of King George Boulevard, and transit corridor-based retail along 104 Avenue. The area around the Surrey Memorial Hospital, emerging as the Innovation District, will be mainly made up of medical office uses that support the hospital and health services.

- Mixed Use 2.5 FAR Areas

  A few 2.5 FAR mixed use areas are located near the outside edges of the plan area. These designations are intended to allow existing institutional uses to densify and add complimentary uses to the site.

- Ground Floor Interface in Mixed Use Areas

  To facilitate pedestrian engagement and activity along City Centre's streets, three ground-floor use classifications have been developed for buildings in mixed-use areas: highly active, less active, and choice of use. These requirements are largely influenced by density and proximity to transit stations.

  Major destinations and close proximity to transit stations will create high pedestrian volumes; therefore, developments in these locations will be required to provide "highly active" uses at the street level. Locations further away from the transit nodes with lower densities will generate comparatively lower pedestrian volumes; therefore, those mixed-

use buildings may provide "less active" uses at street level. Appendix "VII" shows the proposed locations for each interface condition.

Diversity of Housing Type and Tenure

The range of densities and uses provided in the Land Use Plan will facilitate a wide range of housing types and tenures in City Centre. The diversity of housing will help accommodate housing choices for families, students, seniors, working professionals, and vulnerable populations.

- Housing for Families

  To support families living within and close to the downtown, the City Centre plan encourages ground-oriented unit types throughout the plan area. Single family houses form one type of family-oriented housing. Two areas of single family areas have been identified in the plan: one area at the north-east, and the other at the south west. Townhouses are also encouraged because they also provide a ground-oriented unit type for families. These unit types will be permitted in the 2.5 FAR designation areas as well as at the base of all high-rise tower developments in the 5.5 FAR designation areas.

- New Smaller Unit Types

  Smaller units will form a part of the housing mix as there has been a trend towards smaller market housing units in the City Centre. These smaller units include micro-units and lock-off suites. Unit sizes smaller than 375 square feet are referred to as "micro-units." The micro-unit is a newer housing form for Surrey; typically, studio-unit sizes in Surrey developments have been 400 square feet or larger.

  In order to ensure livability in these smaller unit types, the City Centre Plan provides design and locational criteria. Detailed design guidelines can be found in Sections 4 and 10 of the City Centre Plan (Appendix "I").

  The other smaller unit types in the City Centre will include lock-off suites. These are essentially secondary suites within apartments. These unit types offer another option for smaller suites that can be enable condominium owners to rent out or have flexible extra space in their homes. These suites can allow the larger unit to adapt change over time according to the needs of the unit owner. For example, the lock-off suite can also be used as an extra bedroom for family, a student, an in-law suite, or a unit for a caregiver or nanny.

  At this time, lock-off suites will be permitted on a case-by-case basis and introduced as a pilot study in City Centre. Lock-off suite policy and guidelines may be introduced a later date.

- Market Rental Housing

  Rentals make up a significant proportion of the housing stock in City Centre where approximately half of all private households rent. There are four components of market rental housing in City Centre: purpose built rental apartments, condominium rentals, private house rentals, and secondary suites in single family houses.

Purpose built rental apartments comprise a relatively small share (23%) of the rental housing stock in City Centre. The current inventory amounts to 1,437 units, which represents a sizable share (roughly one-quarter) of purpose built rental units in Surrey. The largest segment of market rental housing in City Centre is comprised of condominium rentals. Of the 8,289 condominium units in City Centre, 3,557 units (or 43%) are not occupied by the owners as a primary residence.

House rentals including single family houses, duplexes, and manufactured homes make up a much smaller component of the rental housing stock in City Centre. However, it is believed that houses are much more likely to be rented in City Centre compared to the rest of Surrey. Many of these properties are located in areas that are expected to redevelop at higher densities and it is likely that rental housing is an interim use. Of the 1,667 single family houses, duplexes, and manufactured homes currently in City Centre, 623 (or 37%) are not occupied by the owners as a primary residence and are presumed to be rented.

The final component of market rental in City Centre is the rental of secondary suites in single family houses. There are an estimated 536 secondary suites, accounting for only 9% of rental units. Secondary suites comprise a relatively small portion of rental housing in City Centre largely due to the overall mix of housing types which skews towards apartments. This contrasts with Surrey overall where secondary suites are believed to be the dominant form of rental housing.

- Non-market Rental and Social Housing

  Non-market rental and social housing also form part of the housing mix in City Centre. This includes housing for people with disabilities, seniors, and vulnerable populations. This form of housing may be stand-alone buildings, or form part of a mixed use development in a high density building that is close to amenities, services, and transit.

  The City Centre non-market rental and social housing ranges from seniors facilities, to housing to support people at risk of being homeless. Continued partnerships with other levels of government will help facilitate construction of other projects.

  The City has initiated an Affordable Housing Strategy ("Strategy"). As part of the process, the Strategy will include an examination of protecting and facilitating construction of new affordable rental housing stock and related policies.

Mobility and Transportation

In addition to higher densities and a broad range of uses, a new approach to the street network and street design to support an urban framework is also an integral part of the City Centre Plan. This approach includes creating a finer-grained road network to improve connectivity, and multi-modal street design to accommodate many modes of mobility for all abilities and users.

Finer-grained Road Network

A finer-grained road network will transform the City Centre into a walkable, pedestrian-oriented downtown. The future Road Network Concept is shown in Appendix "VIII". The large blocks that currently characterize much of the City Centre create significant barriers to comfortable, direct, and pleasant pedestrian and cycling circulation, and the efficient movement of vehicles.

The proposed urban grid network will improve connectivity and enhance walkability by allowing pedestrians, cyclists, and cars shorter distances and increased routing options to major destinations. Through redevelopment, smaller more walkable block sizes will be created with the dedication of new roads, green lanes, and pedestrian walkways.

- Block Size

  The Land Use Plan shows the minimum street and lane network that will be required; however, to achieve a block size that promotes high connectivity, additional streets; green lanes; and pathway connections may be required at time of development. The ideal block size will vary depending on the form of development and site size, but generally a block length should be no longer than 80 to 100 metres before a connection is provided. Density will be calculated on the gross site area in order to encourage smaller block sizes without impacting the overall density yield on a development site.

Roads for Multiple Modes

Multi-modal streets will be designed as 'complete streets' in the City Centre. They will be designed to move pedestrians, bicycles, transit, and motorists. The design will focus on improving the pedestrian experience and increasing level of transit and cycling ridership.

- Enhanced Pedestrian Environment

  Various elements of the pedestrian realm have been enhanced to increase pedestrian comfort. This includes high quality concrete sidewalks with light broom finishing and saw-cuts that allow for a smooth and even surface, to ensure mobility for all users and abilities. Wider sidewalk widths will be required in areas with high pedestrian volumes, and features such as public art, in-ground planting, and large tree canopies will create a pleasant walking environment.

- Cycle Tracks

  The downtown is an ideal place for increased cycling trips because of close proximity to amenities and key destinations. However, the lack of perceived safety is the number one reason people do not ride their bicycles. In order to encourage cycling ridership, separated cycle tracks will be installed as part of all future collector and arterial road standards. Research shows that separated cycle track designs will create increased cycling ridership by increasing safety, because the cycling lane is physically separated from motor vehicle traffic. The Standard Drawing updates will be brought forward for Council consideration in a forthcoming Corporate Report.

Rapid Transit

Rapid transit is a cornerstone of the City Centre, both for existing conditions as well as future planning. The existing elevated rapid train system (SkyTrain) links the City Centre with the region north of the Fraser River, with three stations located within the plan area (King George Station, Surrey Central Station, and Gateway Station).

A new Light Rail Train (LRT) network is planned to expand the rapid transit service. This network consists of two lines: the "L-line," which is 10 kilometres long, and the "Fraser Highway Line", which is 17 kilometres long. Both of these lines will connect thorough the City Centre

(shown in Appendix "IX"). In order to further increase the areas served by rapid transit, the network of Rapid Transit bus lines will also be extended.

Parks, Plazas, and Open Spaces

The City Centre Parks and Open Space Plan (Appendix "X") provides the framework for an active and vibrant City Centre, where every resident is within a safe and pleasant walking distance of a park or open space. Parks will support a range of amenities and provide a platform for recreation, community, and social uses. Each park, from larger open spaces with recreation areas, to small neighbourhood greens and pedestrian plazas, are part of a network of open spaces that provide the community with an outlet from a fast moving urban lifestyle.

Parks and Plazas

- Community Parks

  City Centre has 22 hectares (55 acres) of community level parks. The largest park is Holland Park at 10 hectares (25 acres) in size, and it provides a range of active and passive amenities. Other community parks include Whalley Athletic Park, Tom Binnie Park, and Forsyth Park.

- Neighbourhood Parks

  The downtown will contain 5.3 hectares (13 acres) of neighbourhood parks. West Village Park is an existing park that will be integrated with a district energy facility. There are seven other neighbourhood parks planned for the City Centre.

  Location Change of Park Site in Southern Plan Area
  In 2015, staff initiated a process to investigate potential alternative park locations within the Medical District. This process included consultation with land owners and developers, as well as a land use analysis based on CPTED principles, park design criteria, and a walkshed study. Three alternative locations were identified through this process (see Appendix "XI").

  Preferred Park Location
  In November 2015, staff hosted a public information meeting to review the alternative park locations. Staff also met again with property owners and developers in the area. From this process a preferred location, "Option B", was identified. This location is the most centrally located within the district, and is generally agreeable with local residents and developers. The preferred alternative location measures an area of approximately 3,600 square metres (0.89 acres).

- Urban Plazas

  There are three large public plazas in City Centre. The largest is the Civic Plaza, designed as contemporary open space which offers programmable open space for gatherings and large special events. The Civic Plaza will provide a central corridor that connects the institutions of the civic precinct.

Surrey Central Plaza at the Central City Plaza will provide a lively urban open space, connecting the Central City Mall and SFU with the larger civic plaza and precinct to the north, as well as to the BC Parkway and Central City Greenway.

Whalley's Corner Plaza at 108 Avenue and King George Boulevard will provide a contemporary link to the Whalley's history, with opportunities for public art and interpretation.

Greenways

This network will be connected together through an integrated system of greenways (Appendix "X"). The Greenway Network includes:

- BC Parkway
- Quibble Creek Greenway
- Hawthorne Greenway (105A Avenue)
- Port Mann Greenway (from City Parkway, east on 108 Avenue)
- Whalley Parkway (Whalley Boulevard)
- Central City Greenway (102 Avenue)
- Holland Park Greenway (Holland Park, south along 134 Street)

Riparian Areas

- Bolivar Creek and Quibble Creek

Two fish bearing creeks are a unique natural feature of Surrey's downtown: Bolivar Creek at the north end and Quibble Creek at the south end. As development occurs, these creeks will be protected though riparian area setbacks, and also provide enjoyment for residents through future viewing areas and pathways at the edge of the riparian area.

Institutional and Educational Uses

Recreation Facilities

- Chuck Bailey Recreation Centre and Skate Park

Originally built as an Olympic Legacy Project in 2010, the Chuck Bailey Recreation Centre offers a variety of programs supported through a gymnasium, youth lounge, seniors centre, and a range of multi-purpose rooms. The centre also includes preschool services, children's programming, and afterschool programs. Adjacent to the Recreation Centre is a covered youth park, including outdoor amenities for skateboarding, BMX, ball hockey, and basketball.

- North Surrey Recreation Centre

The facility includes a 37 metre pool with aquatic amenities, weight room, fitness studios, and two ice sheets, as well as a variety of multi-purpose rooms. This facility is approaching the end of its functional lifecycle, and will need to be replaced in the near future.

As part of this process, the City will separate the arena and recreation center functions and relocate the ice rinks to a location adjacent to the Scott Road SkyTrain Station. This will provide opportunity for the future expansion of additional ice sheets, while also offering

added flexibility for the redevelopment of the community's recreational and aquatic components within City Centre.

The City has entered into an agreement with the YMCA to facilitate the construction of a new community centre. The new community centre will total approximately 60,000 square feet and will be located within a highly visible location, somewhere in the City Centre. The facility will provide an aquatics centre, fitness centre, a gymnasium, multi-purpose rooms, and public and common spaces.

Civic Facilities

- City Hall and Centre Stage Theatre

  Surrey City Hall, designed by Kasian Architecture and Moriyama and Teshima, was completed in 2013. The new City Hall features a large west wing to accomodate the daily business of the City, and a smaller east wing to house Council Chambers and Legislative Services. At the center, between the two wings, is a glass-enclosed six storey atrium, which also functions a public event space.

  The Council Chambers is designed to transform into a performance venue, called Centre Stage. It provides a 200 seat venue for live performances such as live music, film screenings, small-scale theatre and dance performances, as well as conferences, seminars, and meetings.

- City Centre Library

  Built in 2011, the City Centre Library features 77,000 square feet of library space, including multi-purpose meeting rooms, study spaces, lounging areas, a computer learning centre, a children's department, teen lounge, collection spaces, and a café. The library supports a variety of social and educational services, including children and youth programs, immigrant and settlement services, language classes, technology classes, services for seniors and the vulnerable, and business workshops. The library also serves as a Simon Fraser University satellite campus.

Public Sector Education

- Elementary and Secondary Schools

  There are three high school and eight elementary school catchment boundaries that cover the City Centre area (Appendix "XII"). Many of the schools are located along the periphery of the plan boundary, with two elementary schools and one high school located within the plan area.

  According to the Surrey School District ("School District"), a survey of the schools in the area suggests that the area still has capacity to accommodate growth within the elementary school population; however, the secondary schools are nearing capacity. With the proposed build out, and with combined yields remaining constant, it is estimated that there will be 1,100 more students (670 elementary and 430 secondary) in 10 years.

  Medium-term, the area does have the ability to grow its school capacities within sites already owned by the School District, should funding for additions become available from the Ministry of Education. There is also the potential to re-purpose sites being used for special or alternate programs, should those programs have suitable locations elsewhere.

In 20 years, projections indicate that there will be 1,400 more students in the area (850 elementary and 550 secondary). In 30 years, 3,700 more students will exist (2,250 elementary and 1,450 secondary). Yields will likely decrease as the proportion of high-rise units increases.

In the long term (over 20 year horizon), the School District would not be able to accommodate the growth within existing sites. The creation of an urban school near the heart of the City Centre will need to be a consideration for the longer term. The model for this urban school may include opportunities through partnerships with other post-secondary institutions or with the City.

- Post-secondary Schools

  Two major university institutions are located within the core of the City Centre, as well as several private colleges. Simon Fraser University is the largest educational institution in the downtown. Established in 2003, the Surrey campus is 470,000 square feet in size. Simon Fraser University plans to expand the campus and build a new five storey, 16,066 square metres (172,933 square feet) building for Sustainable Energy and Environmental Engineering programs. It is expected to begin operations in April 2018.

  Simon Fraser University's five year capital plan includes $355 million in a range of new capital projects for City Centre, including a Science Health and Technology Building, a Business Management Building, and a Graduate Facility Building.

  Kwantlen Polytechnic University is planning to add a new campus location in City Centre. It will be integrated into the 3 Civic Plaza development, and is expected to begin operations in 2017. The campus will provide space for Kwantlen Polytechnic University's professional studies, upper-level business courses, and post-graduate credential programs.

Neighbourhoods and Districts

The City Centre Plan area has been organized into a number of distinct residential neighbourhoods and mixed-use districts (Appendix "XIII"), each with its own emerging identity, function, and scale. These sub-areas help to create a focussed, vibrant, and more urban downtown by defining and understanding the plan area through a smaller scale and framework.

The City Centre Plan document describes the future vision, street framework, park network, and urban form for each district and neighbourhood. It also includes specific policies to promote both the preservation of existing recognizable features, and the development of new and distinct urban characters which are unique, authentic, and memorable.

Below is the vision for each neighbourhood and district.

Mixed Use Districts

- Central Downtown District

  The Central Downtown District is envisioned as the heart of the downtown with a vibrant civic, educational, entertainment, and cultural focus. This area is a small, compact, highly walkable area, less than a square kilometre in size (about 800,000 m^2), where there is a

critical mass activity which facilitates major economic, cultural, and institutional exchange. The public realm will provide high quality public spaces, including a large civic plaza for major events. Local office and institutional employees, students, residents, and visitors will support restaurants, galleries, shops, and services along a network of pedestrian-oriented streets.

A major transit hub will be located at the core of the district, on City Parkway, with a convergence of SkyTrain, LRT, and bus. The existing bus loop will be reconfigured into a new on-street transit exchange; and the bus layover and ice arenas will be relocated away from the central core.

The presence of university buildings will expand in the Central Downtown District, creating stronger campus identity and student energy at street level. In addition to animating the downtown with day and evening activity, university activities will draw private research facilities and a range of supporting businesses to the core.

- King George District

King George is envisioned as a secondary office and entertainment node, with high density office and residential mixed uses including a large component of retail. With its proximity to rapid transit lines, and high quality amenity and natural space, this node will attract new residents, and office and related uses, making it an important economic, social, and environmentally sustainable centre in Surrey's downtown.

A commercial "high street" will extend along 98 Avenue from King George Boulevard to Fraser Highway. It will feature prominent green space, public art, bike racks, seating areas, and community gathering points to encourage a vibrant and walkable street-front and transit plaza. Movie theatres, restaurants, shopping, and Holland Park will provide entertainment and leisure opportunities for both residents and employees.

As a major junction point for transit modes – SkyTrain, LRT, and bus – it will be an area with high pedestrian volumes and street activity. Planned extension of the rapid transit into Langley from this station will allow this area to emerge as its own unique district, as significant density is built and transit expansion occurs.

A distinguishing natural feature of the King George District is Quibble Creek, an open water creek system that runs north-south through the eastern side of the district. This will create a unique urban-nature connection as the high-rise residential, office, and retail built environment integrates with the natural open water creek and riparian area. Quibble Creek District Energy Centre will be located at the south east corner of the district, and will identify this area as a sustainable district.

- Gateway District

The Gateway District is envisioned as a secondary office node, known for its views and natural areas. Mixed use office, retail, and residential uses will continue to emerge around the SkyTrain station, creating a thriving office and retail environment. The area on the south side of 108 Avenue will integrate into the station area node as it redevelops, creating mixed use buildings that have active, pedestrian oriented uses at the ground level. The overall densities will taper down away from the central core and give way to apartment and townhouse neighbourhood along Bolivar Creek.

Natural amenities in this district include view opportunities to the north, and an open water creek and its adjacent riparian area. Views of the North Shore, North Cascade Mountains, and the Fraser River Delta will be prominent because the district is situated at the top of Peterson Hill.

Bolivar Creek, located to the west of the high density node, will provide a natural amenity for the residential neighbourhoods. A future large pedestrian bridge will traverse the creek, to connect the eastern and western residential areas of the district.

- Historic District

Building on the historic roots of the area, the vision for the Historic District is to support a pedestrian-oriented eclectic shopping experience through development of a continuous retail edge and pedestrian amenities.

This area emerged during the mid-1950's, giving this area its unique mid-century modern identity. The historic, mid-century modern feel will be preserved and reinforced through redevelopment of small storefronts, building façade treatment and materials, public art, and signage.

Whalley's Corner will be the focal point to showcase the history of the area, and preservation and adaptive re-use of historic signs (for example, Round Up Café and Rickshaw) will create a memorable image for the Historic District. Public art will consider reinterpretation of the area's history in a contemporary way. There will be opportunities for both pedestrian scale and large scale public art installations at Whalley's Corner plaza.

- The Forsyth District

The Forsyth District is envisioned as a medium density residential neighbourhood of apartments and townhouses, connected to neighbourhood parks and a school. LRT corridor will run along 104 Avenue at the southern end of this district.

The 104 Avenue corridor will evolve into a dense urban rapid transit corridor lined with active commercial uses, surrounded by a medium density residential neighbourhood that supports transit.

The LRT corridor will help shape development of vibrant retail nodes that will be well connected to the residential neighbourhood. Higher intensity retail and small scale office nodes will form around LRT stations at Whalley Boulevard and 140 Street. Additional through-roads connections along 104A Avenue and 103 Avenue will provide important alternative routes to move traffic east-west.

The residential core of the neighbourhood will be family-oriented and highly walkable because of its fine-grained street network green lanes and pathway system. A unique feature of this neighbourhood will be the green lane density, which will be higher compared to other neighbourhoods. These green lanes will likely be off-set, as they will be achieved through incremental development that integrates with the existing development blocks. The off-set lane pattern will create a "meandering" feel, to give this neighbourhood a unique charm.

- Medical District

  This area will form a dense medical and health technology office district, having the highest concentration of innovation and health related offices in the City, as well as mixed-use residential and supportive housing. Companies will co-locate with a major hospital (Surrey Memorial), health institutions, research and technology firms, a health technology accelerator and incubator centre, and research university to create a health technology and innovation focus within Surrey's downtown.

  An underground, high-capacity fiber optic network will support data-intensive research and innovation across a range of public sector users. This advanced infrastructure will not only help support existing technology, but also attract new medical and health technology uses.

  High quality public realm, including amenities, will support office and health sector employees, visitors, and residents. Active ground floor interfaces for office buildings will include retail uses such as coffee shops, and other amenities such as benches, high quality landscaping, and public art.

Residential Neighbourhoods

- Bolivar Heights

  With open northern views to the river and mountains, this neighbourhood will be a unique, single-family area near the higher density core of the downtown. The vision for this neighbourhood is to preserve strong single family residential built form and character, while providing opportunities for gentle infill. Bolivar Heights neighbourhood will be centered around a new neighbourhood park, Grosvenor Park, which will reflect the existing single family residential character of the area.

  Pockets of larger lots within the neighbourhood, including properties along Grosvenor Road, 112 Avenue, and other major roads, will see redevelopment into denser single family housing forms. These include small lots, coach houses, and manor homes to allow quad-plexes and duplexes, with lane access.

  As gentle infill occurs, a street-grid that provides a high degree of connectivity will be created. New streets created through subdivision will blend into the existing neighbourhood character. The streets will be named rather than numbered, in order to integrate with the existing street names that provide a historic character in this neighbourhood.

- The Bailey

  The culture of "sport" will be a strong element in this neighbourhood's character, featuring a large athletic complex formed by major athletic parks that include baseball diamonds, a football practice facility, a recreation centre, and a covered outdoor skate park. This athletic precinct will become the true heart of the area.

  With its strong history of Whalley Little League, the Whalley Athletic Park will continue to be a major destination for baseball. The park will also include a common area with

seating, landscaping, and pathways which will appeal to a diverse and wide group of users, as well as provide additional amenities to the surrounding residential area.

Residential redevelopment surrounding the athletic fields and recreation centre will introduce active edge conditions along the perimeters of park and athletic fields. High-rise residential buildings will include a strong pedestrian scale podium, and units will be oriented toward the park to provide natural surveillance of the open space.

- West Village

  This neighbourhood is envisioned as a high density green urban village connected with fine-grained pedestrian walkways, green lanes, plazas, and open space areas.

  A pedestrian-oriented public realm will be a fundamental design feature of this urban neighbourhood. High-rise tower developments will provide townhouse or 4 storey podiums to create a pedestrian-friendly interface. A dense network of pedestrian pathways will create small block sizes and increased walkability.

  Publically accessible open space will permeate this neighbourhood. Corner plazas will be designed with each development, in order to provide additional outdoor amenity space. These plaza areas will include seating, art installations, specialty paving, and other unique features.

  Surrey's first District Energy Centre will be located in this neighbourhood. This building, co-located with a neighbourhood park, will identify this neighbourhood as a truly green, sustainable urban village.

- Green Timbers

  The Green Timbers neighbourhood is envisioned as a medium density residential neighbourhood, connected with a large north-south green corridor lined with pedestrian-oriented amenities. The neighbourhood's close proximity to Green Timbers Urban Forest also contributes to the area's green identity, through its connection to large natural areas.

  The powerline greenway is the largest identifying feature of this neighbourhood. Public amenities will enhance the powerline greenway, and its features will vary from north to south. Elements will include natural drainage features that connect the corridor into the headwaters of Quibble Creek, off-leash dog areas, bike jumps, pathways, community gardens, seating, and public art.

  Four to six storey apartments will be the dominant housing form in this neighbourhood, ideally located in close proximity to major employment areas to the eastern side of the neighbourhood (Jim Pattison Outpatient Facility and RCMP E Division). New residential developments will integrate with the existing apartments and provide improved neighbourhood walking connections through the provision of pathways that run through private development sites that connect with greenways and transit.

- Holland Park

  Located by Surrey's largest urban park, the Holland Park neighbourhood will be a highly desirable family-oriented neighbourhood adjacent to park amenities and within close proximity to transit, retail, and entertainment uses.

  The neighbourhood built form is envisioned to remain largely a single family in character, with a small area of medium density apartments. Gentle infill development will add incremental density to the single family areas. Redevelopment of sites along 100 Avenue and 134 Street will allow duplexes, small lots, coach houses, quad-plexes, and manor homes. The area south of Holland Park will see more change, with redevelopment of single family homes into mid-rise apartments.

  The large urban park will provide residents with daily amenities such as walking loops, playgrounds, volleyball courts, and gardens. It will also attract people City-wide for its major events, festivals, and music concerts.

Urban Design Framework

High quality urban design will play in integral role in shaping a downtown that is vibrant, pedestrian-oriented, and urban. The following urban design objectives have been established to help support the larger City Centre vision:

1. Establish an identifiable skyline for the downtown.
2. Integrate high density with walkability and transit orientation.
3. Create a high quality, attractive architectural built form.
4. Establish an image of a green City Centre.
5. Provide high quality, vibrant public realm.
6. Use west coast contemporary lines and natural materials.
7. Foster unique identities in character areas.

Detailed Urban Design Guidelines, in Section 10 of the Plan document (Appendix "I"), provide specific details on skyline and building heights, block structure and connectivity, site design, ground floor interface, and the public realm in the City Centre.

Cultural Corridor

As Surrey's City Centre transitions to a more metropolitan landscape, cultural assets will contribute to creating a more urban and interesting downtown. An organizing framework for the cultural vision in City Centre is the Cultural Corridor, which creates a unique hub of services, venues, and public art that concentrate cultural activites and groups in a critical mass.

The Cultural Corridor is centered along King George Boulevard, which runs through the central core of the plan area, bound by 96 Avenue at the south and 108 Avenue at the north. This portion of the corridor forms the northern part of the City-wide Cultural Corridor, along King George Highway from 108 Avenue in the north to the South Surrey Town Centre.

Policy and By-law Changes

Publically Accessible Outdoor Amenity Space

Access to outdoor space is an important component for creating a livable and healthy downtown. To meet that goal, the City Centre Plan has proposed parks within 400 metres of all residents; however, the City parks will not provide sufficient space for the anticipated higher residential and employment densities proposed for the downtown, and additional space will be needed.

To supplement City parks and plazas spaces, the City Centre Plan proposes that multi-family development projects include publically accessible corner plazas and/or public open space on the development site. The Development Permit Area Guidelines in Surrey's Official Community Plan also provide this policy direction for providing publically accessible open space as part of redevelopment in urban areas.

Zoning By-law requirements do not permit the location of outdoor amenity space within the setback area of a site; however, spaces at the corner and the edges of a site are ideal spaces for publically accessible space, because they do not intrude into the private areas of a development.

- Revision to City Policy O-48

  To support the inclusion of publically accessible outdoor amenity space in private developments, revisions to City Policy O-48 "Relaxation of the Provision of Indoor and Outdoor Amenity Space in Multiple Residential Developments" are proposed (Appendix "IV"). These changes would allow a maximum of 0.75 square metres [8 square feet] per dwelling unit of the required outdoor amenity space to be provided as public outdoor space.

  The publically accessible space would be permitted within the setback area, and would include a higher level of amenity than the standard landscaping within a setback area. Additional amenities could include seating, public art, fountains, specialty surfaces treatments, and enhanced stormwater features. The public outdoor space would be secured by a statutory right-of-way.

Artist Studios and Cultural Uses

Arts and cultural facilities can provide a physical framework to support a thriving and vibrant downtown that enriches the lives of residents living in City Centre. A strong cultural sector also feeds into a vibrant urban economy.

- Zoning By-law Amendments

  To help support the development of a cultural economy in City Centre, amendments are proposed to the Zoning By-law to allow for artist studios as a cultural uses (Appendix "III"). These amendments include the inclusion of an "artist studio" definition, as well as the addition of "artist studio" as a permissible use under *Cultural Uses* in the Zoning By-law.

  All *Cultural Uses* will also be added as permissible uses in several commercial zones, including Community Commercial Zone (C-8), Downtown Commercial Zone (C-35), and in City Centre, the Highway Commercial Zone (CHI).

Amenity Contributions

In accordance with City policy to address the amenity needs of the proposed new residents in Plan Areas, all development proposals at the time of rezoning or building permit issuance will be required to make a monetary contribution toward the provision of police, fire protection, and library services, and toward the development of the parks, open spaces, and pathways.

The monetary contributions toward police, fire services, and library services will offset the capital costs of providing these services to new development, and are applied on a standardized basis in all of Surrey's Plan areas. The monetary contributions toward parks, open spaces and pathway development are based on an estimate of the capital costs of these improvements for this particular area. The total estimated cost is divided by the average anticipated number of dwelling units (and acreages, in the case of non-residential development) to ensure an equitable contribution arrangement.

A new amenity contribution has been introduced to equalize the burden of undergrounding third party utilities (electrical, telephone, cable, and internet). As part of the higher level of urban design in City Centre, all utilities are required to be located underground. Under the existing policy, there is an inequitable distribution of costs for undergrounding these utilities. Some properties are burdened with undergrounding utilities on two frontages, while others have no requirement. The new amenity contribution will equalize the cost of utility undergrounding between all property owners.

The details for the amenity contributions are described as follows:

- Park Amenity Contributions

  The development of new parks and new park amenities identified within the plan will be funded through Park Amenity Contributions collected on new development. Staff completed a detailed needs assessment and costing exercise to determine an appropriate amenity level and associated funding requirements. Staff is proposing a variable Park Amenity Contribution rate, to acknowledge the reverse correlation between unit size and dependence on parks and outdoor public spaces. The resulting amenity rate is highest on a square foot basis for smaller units, and is lowest when more bedrooms are added, on the same basis. The rates are as follows:

  - $1,207.00 – Bachelor and Studio Units
  - $1,375.00 – One Bedroom Units
  - $1,554.00 – Two Or More Bedroom Units

- Fire and Police Protection Amenity Contributions

  Future development in City Centre will drive the need to upgrade existing fire and police protection facilities. A study of fire protection requirements in Surrey's neighbourhoods has established that a contribution of $281.46 per dwelling unit for single family and $1,125.83 per acre for non-residential development (in 2016 dollars) will cover the capital costs for fire protection. Similar to Fire Services, a contribution of $65.16 per single family dwelling unit and $250.56 per acre for non-residential development will cover the capital costs for police protection.

Staff is proposing a variable rate for multi-family Fire and Police Protection Amenity as follows:

Fire Protection

- $ 84.44- Bachelor and Studio Units
- $ 112.59 - One Bedroom Units
- $ 140.73- Two Or More Bedroom Units

Police Protection

- $19.55 – Bachelor and Studio Units
- $26.06 – One Bedroom Units
- $32.58 – Two Or More Bedroom Units

- Library Services Amenity Contributions

  A study of library requirements in Surrey's neighbourhoods has established that a contribution of $146.58 (in 2016 dollars) per dwelling unit for single family and $58.63 for multi-family (non-residential development is exempt) is necessary to cover the capital costs for library materials and services, which is sensitive to population growth.

  Staff is proposing a variable rate for multi-family Library Services Amenity as follows:

  - $43.97 – Bachelor and Studio Units
  - $58.63– One Bedroom Units
  - $73.29 – Two Or More Bedroom Units

- Undergrounding Utilities Amenity Contributions

  The new amenity contribution will be collected on all properties to fund the undergrounding of utilities. For all uses, the rate proposed is $1.66 per buildable square foot.

The amenity contributions are payable upon subdivision for single-family subdivisions, or upon issuance of building permits for multiple development and other uses. New applications received on or after the date of this report will be required to pay the amenity abovementioned amenity rates.

For the Park Amenity Contribution, all in-stream applications that have received third reading at Council on or before the date of this report will have one year from Plan approval to complete their application process at an interim park amenity contribution rate of $750 per dwelling unit. Applications that are delayed further will be required to provide the above-mentioned park amenity rates, on a per dwelling rate.

For all the other amenity contributions, in-stream applications that have received third reading at Council on or before the date of this report will have one year from Plan approval to complete their application process and will not be required to pay the above-mentioned amenity rates. Applications that are delayed further than one year will be required to provide the above-mentioned amenity rates.

A summary of the funding arrangements for the Amenity Contributions is provided in the table below.

City Centre (Uses and Unit Types)	Park, Pathway and Facility Development	Library Materials	Fire Protection	Police Protection	Under-grounding of Utilities	Total
Residential: Single Family (\$ per *dwelling unit); **plus** (\$ per buildable sq. ft.)	\$1,554.00	\$146.58	\$281.46	\$65.16	 \$1.66	\$2,047.20 \$1.66
Residential: Multi-Family a) Bachelor and Studio: (\$ per *dwelling unit)*; **plus** (\$ per buildable sq. ft.)	\$1,207.00	\$43.97	\$84.44	\$19.55	 \$1.66	\$1,355.00 \$1.66
b) One Bedroom (\$ per *dwelling unit);* **plus** (\$ per buildable sq. ft.)	\$1,375.00	\$58.63	\$112.59	\$26.06	 \$1.66	\$1,572.28 \$1.66
c) Two Or More Bedrooms (\$ per *dwelling unit)*; **plus** (\$ per buildable sq. ft.)	\$1,554.00	\$73.29	\$140.73	\$32.58	 \$1.66	\$1,800.60 \$1.66
Non-Residential (\$ per acre) (\$ per buildable sq. ft.)	N/A N/A	N/A N/A	\$1,125.83	\$250.56	 \$1.66	\$1,125.83 \$1.66

SUSTAINABILITY CONSIDERATIONS

The City Centre Plan outlines a vision for City Centre that aligns with Surrey's Sustainability Charter 2.0 vision for a thriving, green, inclusive city, as well as with numerous Desired Outcomes and Strategic Directions across all themes.

Specifically, the Plan supports the following Desired Outcomes listed in the Charter as follows:

- **Built Environments and Neighbourhoods**
  Desired Outcome 1: Surrey is comprised of distinct, diverse and compact neighbourhoods and Town Centres, with an engaging public realm.

- **Built Environments and Neighbourhoods**
  Desired Outcome 3: The City Centre is a dynamic, attractive and complete metropolitan area and important international destination, and is one of North America's most livable and desirable downtowns.

CONCLUSION

The City Centre Plan Update proposes policy changes to create a truly vibrant, energetic and successful downtown for Surrey. These changes include introduction of Urban Design Guidelines, Neighbourhoods and Districts Concept, Revised Park and Open Space Concept, Finer-grained Road Concept, and associated amenity contributions.

Based on the above discussion it is recommended that Council:

- Receive this report as information;

- Approve the final and complete City Centre Plan, as attached in Appendix "I";

- Approve the amenity contributions specified in the City Centre Plan, for supporting the development and provision of services, amenities, facilities, and undergrounding of electrical, telephone, cable, and internet utilities for City Centre;

- Authorize the City Clerk to introduce the necessary bylaws to amend Surrey Zoning By law, 1993, No. 12000 ("Zoning By-law"), as documented in Appendices "II" and "III", and to set a date for the related public hearing; and

- Approve revisions to Policy O-48 as shown in Appendix "IV", to allow a maximum of 0.75 square metres [8 sq. ft.] per dwelling unit of the required outdoor amenity space to be provided as public outdoor space, as part of development in City Centre.

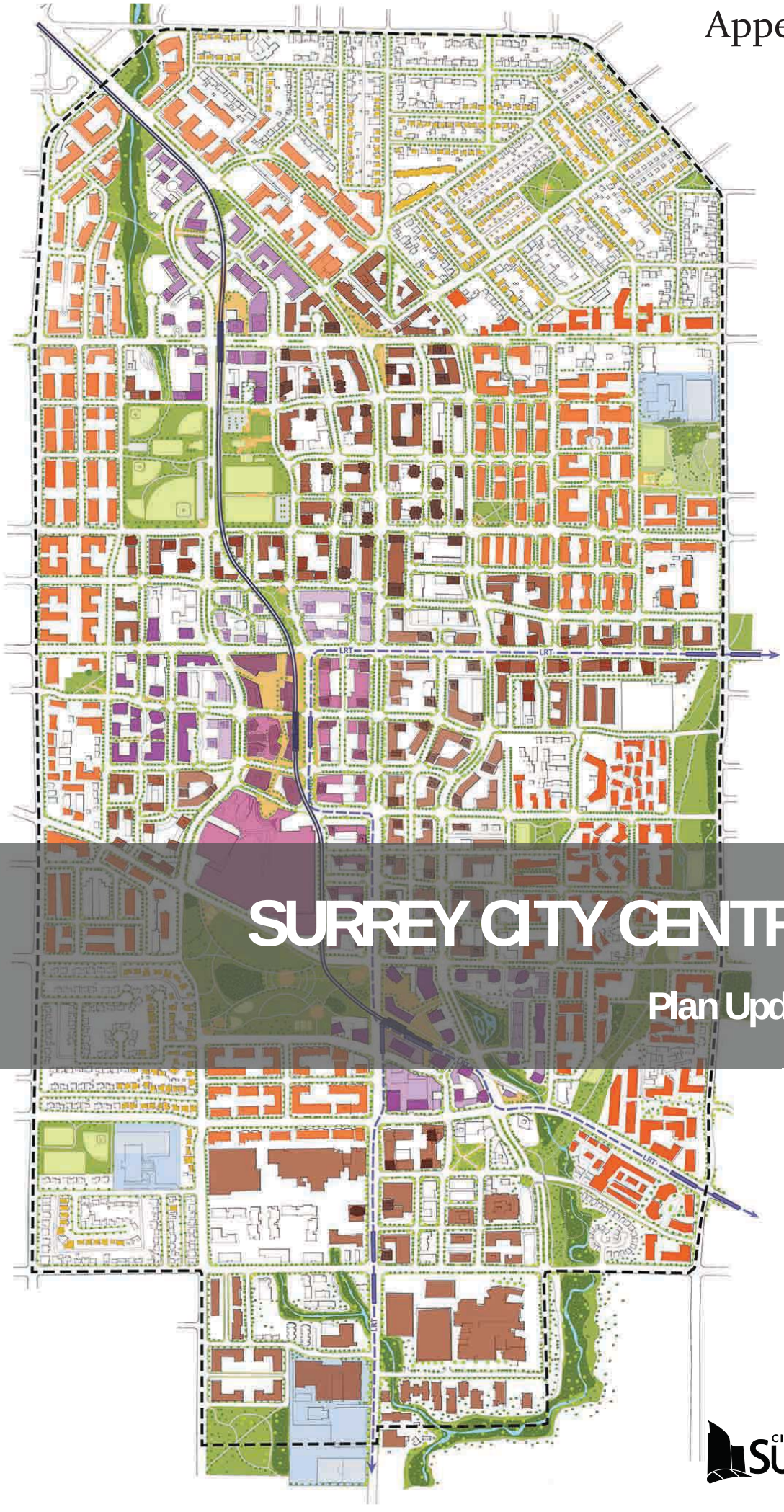
Original signed by
Jean Lamontagne
General Manager,
Planning & Development

PH/ss

Attachments:

Appendix "I"	Surrey City Centre Plan
Appendix "II"	Zoning By-Law Amendments related to Amenity Contributions
Appendix "III"	Zoning By-Law Amendments related to Artist Studio and Cultural Uses
Appendix "IV"	Revised Policy O-48
Appendix "V"	Public and Stakeholder Engagement and Consultation Summary
Appendix "VI"	Land Use and Density Concept
Appendix "VII"	Mixed Use Ground Floor Interface Concept
Appendix "VIII"	Road Network Concept
Appendix "IX"	Transit Within City Centre
Appendix "X"	Parks and Open Space Concept
Appendix "XI"	Alternative Park Locations Examined for the Medical District
Appendix "XII"	Secondary and Elementary School Catchment Boundaries
Appendix "XIII"	Neighbourhoods and Districts

Appendix "I"



SURREY CITY CENTRE

Plan Update

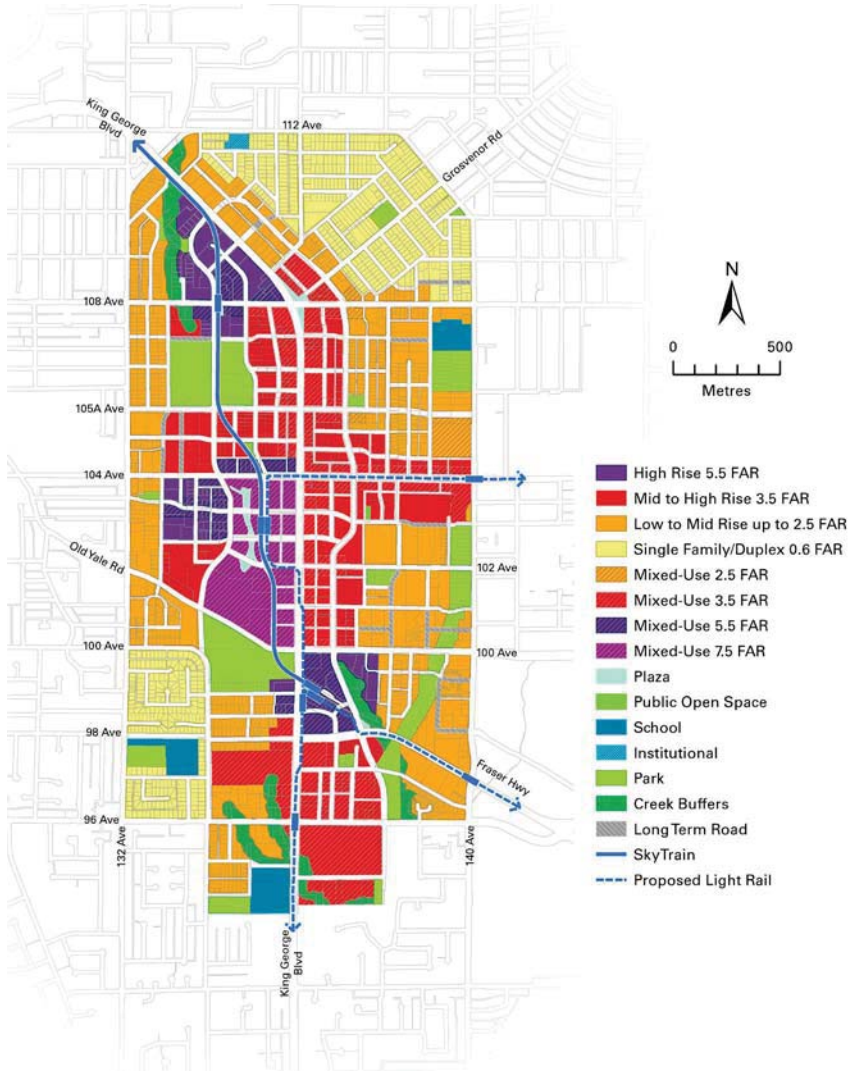
CITY OF SURREY

Surrey City Centre Plan

Planning and Development,
Parks Planning & Design and
Engineering Departments

City of Surrey
13450 104 Avenue
Surrey, British Columbia V3T 1V8

APPROVED BY COUNCIL JANUARY 2017



Surrey City Centre Plan
Approved by Council: January 16, 2017

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INTRODUCTION

Over the last 15 years an identifiable downtown core has started to take shape in Surrey City Centre. This transformation largely stems from new public sector investment, which is renewing private sector development interest and helping to facilitate key land assemblies in the downtown.

Along with this redevelopment, the transportation context is evolving. There is now a stronger focus on multi-modal street design that facilitates movement for all users including pedestrians and cyclist. Transit plans include improvements to existing facilities and plans for a future at grade rapid train system are underway.

The first City Centre Plan was completed in 1991, and is now 25 years old. Since its approval, the intended vision did not fully materialize as development in the area was erratic and sparse.

Fifteen years after the original plan was adopted, there was a renewed interest in development in this area. However, the downtown context and development assumptions had changed from that identified in the original plan. As a result a renewed vision was needed and in 2006 the City Centre Plan Update began.

The City Centre Plan update was undertaken in three phases and the final phase is now complete. Phase one began in 2006 and included background studies and an analysis of existing conditions. Phase two involved the development of the land use concept, road network, establishment of park and green space areas and an interim development strategy to provide guidance for development application. This phase was completed in 2009. The final phase involved refinements to the plan, development of design guidelines and implementation strategies for servicing and financing.

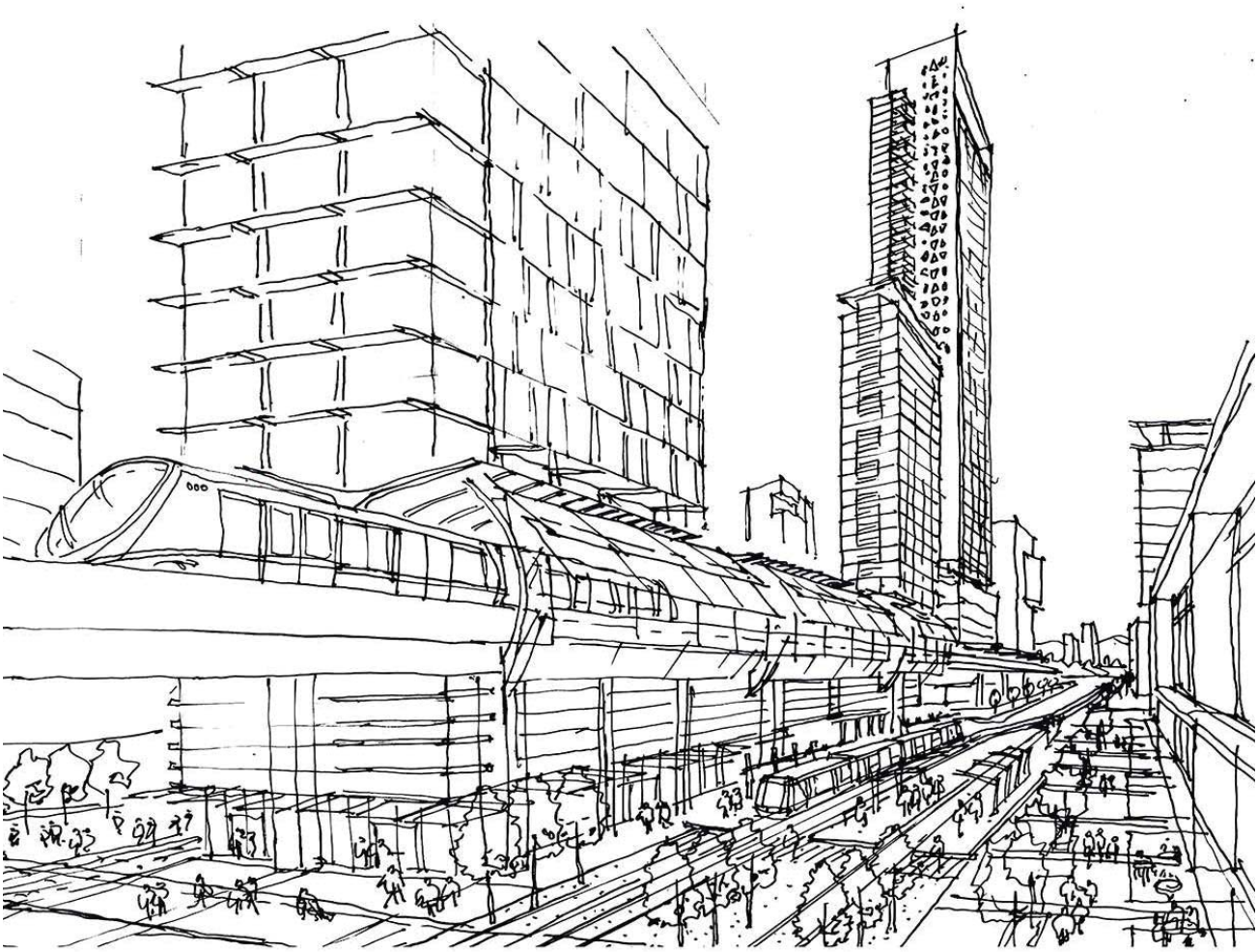
This plan document is a culmination of the three phases and forms the final and complete City Centre Plan that will guide development in this area over the next 30 years. The plan includes a comprehensive renewal of the City Centre vision and sets out a policy direction that builds on the current development momentum in Surrey's downtown.

The plan is organized into 4 parts:

- Foundation
- Framework
- Implementation
- Appendices

PART A

Foundation



SECTION 1
Vision & Guiding Principles

1
VISION & GUIDING PRINCIPLES

This section outlines the vision and guiding principles that will transform Surrey City Centre into a vibrant and robust downtown for the South of Fraser Region.

1.1 VISION

Surrey City Centre is undergoing a bold transformation from a suburban town centre to a walkable, high density, transit-oriented downtown for the South of the Fraser area. These remarkable changes have been driven by a new vision for the area.

Surrey City Centre will be the Fraser Valley's metropolitan centre, connected to major regional destinations by rapid transit and a safer finer grained road network designed to support walking, cycling and transit. It will be a centre for major employment, services, higher-density housing, commercial, cultural, entertainment and institutional activity. City Centre will be home to a diverse population, including new immigrants & established residents, young professionals, families and children, youth, and seniors.

Distinct and vibrant neighbourhoods including a dynamic and innovative business sector, university, hospital, civic and historic districts will form the framework of the City Centre. Each of these areas will have its own unique character that will create a diverse, authentic and interesting downtown.

The downtown will be known for its green urban infrastructure of parks & plazas, greenways, planted boulevards & rain gardens. Natural features including fish bearing creeks, riparian areas and spectacular views to the North Shore mountains will be enhanced and maintained.

Looking North along City Parkway-Future Concept

1.2
GUIDING PRINCIPLES

The plan is guided by a set of principles that drive the strategic direction, policy framework, and implementation strategies that shape development in the City Centre.

A set of eight guiding principles have been established to support the transformational vision for a vibrant, urban and green downtown:

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- Build Density & Mixed Use
- Encourage Housing Diversity
- Break Up the Block Size
- Design Roads for Multiple Modes
- Create Vibrant Urban Spaces
- Green the Downtown
- Encourage Office & Employment
- Promote Identity & Sense of Place

Build Density & Mixed Use

Higher residential densities and a diverse mix of land uses close to transit differentiate the downtown from other parts of the city. These high density mixed use areas provide residents with easy access to urban amenities, shopping, entertainment, education and employment and also support higher levels of walking, cycling and transit use.

This density and mix of uses creates a City Centre that is more animated, livable and a place that thrives economically where residents can work, play and live in their neighbourhood.

Encourage Housing Diversity

Thriving downtowns have a range of housing types and tenures to support a diverse metropolitan population. Housing diversity in City Centre helps to provide housing choice for families, students, seniors, working professionals, and vulnerable populations. Land use designations accommodate a variety of housing forms and a range of unit sizes and types. This housing supports a full spectrum of tenures including ownership and rental as well as supportive and social housing.

Break Up the Block Size

A network of regularly spaced and interconnected streets with small, urban-sized blocks allows increased connectivity between residential, commercial, cultural, civic and social activities in the City Centre. This fine-grained street network of small blocks creates frequent intersections, and provides a variety of routes that increase mobility choices for pedestrians, cyclists and motorists alike.

Smaller block sizes encourage pedestrian movement by providing shorter walking distances and direct connections to amenities. Small blocks provide greater flexibility for transit operations and bus routings and create multiple channels and turning options for motor vehicles, giving drivers more route choices. Ideal block sizes vary depending on the form of development and site size, generally block length should be no longer than 80 to 100 metres before a connection is provided.

Design Roads for Multiple Modes

Well-designed, 'complete' streets improve safety, facilitate mobility for all modes, and provide the framework for sustainable and economically robust places. Streets in City Centre are designed to serve multiple roles: connecting people, improving the public realm, sustaining a healthy tree canopy, and supporting economic activity. Streets will be designed so that people of all ages and abilities can safely, conveniently, and comfortably get around regardless of their mode of transportation.

While the conventional role of arterial roads is to facilitate through-movement of cars, the urban street network planned for City Centre will move all road users. Arterial roads will continue to be major corridors for vehicular traffic and transit, but will balance average speeds to enhance the safety of diverse users and encourage walking, cycling, and transit. Collector and local roads will feature improved designs that prioritize active transportation.

Create Vibrant Urban Spaces

A high quality public realm with continuous active streetscapes, urban amenities, and cultural activities and facilities contributes to the vibrancy and livability of the downtown. As redevelopment occurs, urban design standards require high quality architectural aesthetics and amenities such as plazas public art, street furniture, and elements of green infrastructure to encourage people to linger and interact in the public realm. The pedestrian scale will be reinforced through building design; the base of high rise buildings will typically have a two to four storey podium and weather protection to increase pedestrian comfort. Active retail uses, and a continuous 'streetwall' adds pedestrian interest and rhythm to the streetscape.

Green the Downtown

Access to natural and recreational space is one of the defining elements that contribute to urban livability. These spaces, either natural or human-made, provide relief from city density by softening the urban hardscape. The City Centre plan includes a wide range of parks, plazas and natural areas within walking distance to all neighbourhoods and districts. These include large scale urban parks, athletic parks, neighbourhood parks and mini-parks and plazas.

Natural areas create a unique identity in the downtown. Two fish bearing creeks are located in the City Centre: Bolivar Creek in the north and Quibble Creek in the south. As development occurs, these creeks will be protected as parkland though riparian setbacks, and will provide enjoyment for residents through the development of viewing areas, pathways and natural area rehabilitation projects.

Encourage Office & Employment

A key factor that defines the City Centre is its economic significance. The downtown will house a concentration of office, retail, cultural and other employment uses in Surrey. Public sector investment will continue to be an important economic component of the City Centre. Expansion of universities, government offices and the Medical District will attract related health technology, office and retail uses that strengthen economic activity in the downtown.

Convenient access to rapid transit contributes to the attraction of office and employment uses into the downtown. The existing SkyTrain and future light rail will serve as catalysts for continued investment in the downtown economy.

To support office and retail expansion in the downtown the City Centre Plan facilitates residential redevelopment and densification to provide a sufficient population to support retail and office and enliven public spaces. Redevelopment will increase investment in urban amenities that attract office employment, such as public art, street furniture, public realm beautification, plazas and parks.

Promote Identity & Sense of Place

Fostering a sense of place and identity in the City Centre creates a downtown that is unique, interesting and memorable. However, since the plan area is 1,300 acres in size, the downtown is too extensive to have a single recognizable identity. To promote and foster a sense of place, the City Centre area needs to be understood at a smaller scale, with small diverse sub-areas that can be experienced at the pedestrian level.

To support this framework, the City Centre Plan area has been organized into different districts and neighbourhoods that are small enough to be experienced by walking. Each area has its own identity, form and function. While some of these areas have an existing character and history, in other areas a distinct identity is newly emerging through redevelopment. Together, these unique character areas will create a downtown that is authentic and memorable.

SECTION 2
Background & Context

Photo: Insert Location

2
BACKGROUND & CONTEXT

This Section provides background on the plan update process and also outlines the historic, current and policy contexts including the demographic profile of the City Centre today.

2.1 BACKGROUND

Need for an Updated Plan

Since the first City Centre plan was completed in 1991, the anticipated pattern of development has evolved and changed stemming from new public sector investment, renewed development interest and key land assemblies. The transportation context has also evolved with a recent focus on multi-modal pedestrian oriented street design and plans for a future Light Rail Transit (LRT) system.

The original City Centre Plan was coordinated by Ray Spaxman in consultation with city staff. Key recommendations of the 1991 plan included concentration of density at the SkyTrain stations, construction of a ring road system and implementation of urban design and streetscape features. This work was supplemented with the Whalley Enhancement Strategy and Urban Design Concept in 2003.

Development after the adoption of the 1991 plan ranged between almost no activity, to periods of intense activity which was not always concentrated at or near the skytrain stations as was intended in the 1991 plan. The resulting development pattern did not create a complete and identifiable City Centre.

In order to redefine the vision and establish a desirable development pattern for the downtown, an updated City Centre Plan was needed. On July 24, 2006, Council authorized staff to proceed with an update to the 1991 Surrey City Centre Plan.

2.2 PLAN AREA

Plan Update Process

The new plan update was proposed in three phases:

- Phase One: Analyzing Conditions
- Phase Two: Stage 1 Developing the Plan
- Phase Three: Stage 2 Implementing the Plan

Phase One included an analysis of existing conditions and initiation of dialogue with stakeholders to identify key issues. Bing Thom Architects firm were engaged to provide land use and urban design consulting services.

During this phase, the Surrey Central Transit Village Plan (which was initiated in 2004 under the Transport Canada Urban Transportation Showcase Program) was also underway. This study examined the area immediately around the Surrey Central Skytrain Station.

A key recommendation of the Surrey Transit Village Plan proposed relocation of the existing bus loop to a transit couplet, which is a system of two parallel streets with pick up and drop off on city streets that are lined with active retail and public uses. The land occupied by the bus loop was proposed to be redeveloped with high density uses to bring vibrancy to the area. These recommendations were incorporated into phase one of Surrey City Centre Plan update process.

Phase Two involved generating several land use options and receiving public feedback on these options through public open houses, meetings with a Citizen's Advisory Committee, landowners, developers, and other stakeholders.

Finalization of the second phase included a Land Use and Density Concept, a Basic Road Network framework, a Road Width Concept, a Parks and Open Space Concept, and an Interim Implementation Strategy.

Phase Three of the City Centre Plan update involved undertaking additional background studies including a 3-D Modeling Study to inform the urban design guidelines and Building Heights Concept; a Green Network Study to further develop the Parks and Open Space Concept; a Heritage Study to help supplement the neighbourhoods and placemaking work; the development of City Centre Road Standards; and a detailed servicing and financial strategy.

Plan Boundaries

Surrey's City Centre is located in northern Surrey and is approximately 540 hectares (1,300 acres) in size. The plan area is generally rectangular in shape with King George Boulevard, a former Provincial highway and major goods movement route, running north/south through its centre. The Plan area is bound by 112th Avenue to the north, 94A- Avenue to the south, 132nd Street to the west and 140th Street to the east. **Map 1** shows these boundaries.

Map 1 Surrey City Centre Plan Boundaries

2.3
PLAN CONTEXT

Area History

Kwantlen First Nation

The Kwantlen First Nation came to the Surrey-New Westminster area many hundreds of years ago. By three hundred years ago they were a powerful nation with a large community called Squaimetl (sx_woyimehl) where New Westminster is now located. The Royal Kwantlen Park area, immediately west of Surrey City Centre, was a place of refuge for the Kwantlen nation.

In 1871, the Kwantlen nation was deeded a 40 acre (16 hectare) site on Old Yale Road as part of their treaty lands (Kwantlen Indian Reserve #7).

In 1954, the City of Surrey purchased the 40 acre reserve from the Kwantlen nation for $40,000. By 1956, K.B. Woodward Elementary School was built on the site.

The opening of West Whalley Junior Secondary followed in 1957. In 1959, Surrey decided to use the remaining portion of the former Kwantlen Reserve to create a park for Whalley. Today, this park is known as Royal Kwantlen Park.

Early Settlement

Originally, the City Centre area was a rural farming and logging community. Settlers began pre-empting land in the vicinity of present-day Surrey City Centre as early as the 1880s.

In 1908, Surrey Council requested a grant to build a road from the old Fraser Bridge in South Westminster, southward up Peterson Hill to present-day 108th Avenue. In 1923, the Pacific Highway (passing through future Whalley) had been paved all the way to the U.S. Border.

With the proliferation of the automobile already evident, Arthur Whalley built a service station in 1925 at the present day corner of 108 Avenue and King George Boulevard. It included a small general store, soft drink stand, and tourist cabins. The intersecting roads did not exist at that time but this was the first gas station outside of New Westminster at the time, and the area became known as Whalley's Corner.

Post War Suburb

Major auto-oriented growth of the current-day City Centre was largely facilitated by the construction of new bridge connections: the Pattullo and Port Mann. The opening of the Pattullo Bridge in November 1937 provided the impetus for more rapid settlement of North Surrey. When the tolls were removed from the Pattullo Bridge in 1952, the Whalley area saw a major commercial and residential building boom.

Tom Binnie established the first real estate office in Whalley. In 1947, his "Binnie Block" was one of the first commercial buildings along King George Highway, with the Cameo Theatre and a branch of the Bank of Nova Scotia. The same year also marked the official opening of a post office at Whalley's Corner.

Surrey's oldest shopping mall, the Dell Shopping Centre, opened in the late 1950's. It was designed as a shopping plaza oriented to the King George Highway.

Surrey's first hospital opened in 1959. Prior to that, Surrey residents were served by Peace Arch Hospital in White Rock.

In 1972, Surrey's first enclosed shopping mall opened with the construction of Surrey Place Mall (now Central City Mall).

Moving Toward an Urban Centre

Beginning in the 1990s, major investment in rapid transit infrastructure laid the foundation for the development of a more "urban" framework in City Centre. This was realized through the extension of an elevated rapid train system, the SkyTrain, into Surrey. As part of this network, four skytrain stations were planned for Surrey, three of which were located in City Centre. The Surrey SkyTrain stations opened in 1994.

The opening of Skytrain was followed by the construction of Simon Fraser University's Surrey Campus and a Triple-A office tower in 2003 and the redevelopment of a 29-acre urban park, Holland Park. These developments started to change the energy in the downtown resulting from a greater presence of employees and students in the core area.

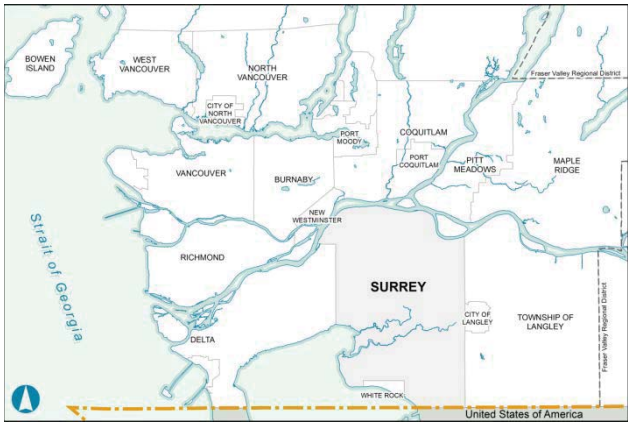
City Centre Today

Regional Framework

Situated at the heart of the region, Surrey's City Centre area is designated as the region's second metropolitan centre in the Metro Vancouver 2040 Regional Growth Strategy.

The City Centre's central location allows for a number of major locational advantages which include:

- Direct SkyTrain connection on the Expo Line with two Regional City Centres and a Municipal Town Centre ending in Downtown Vancouver in 35 minutes, and with rail and SeaBus transfer connections to 3 other Regional City Centres and 4 other Municipal Town Centres;
- The hub of a future Light Rail Transit network that will connect Surrey City Centre with Guildford, Newton and Langley, transforming Surrey City Centre into one of the most accessible City Centres in the Region;
- Similar driving proximity (35 minutes) to two international airports- Vancouver and Abbotsford; and easy access to the US-Canada Border, and,
- Views of natural regional features such as mountain ranges and the Fraser River to the north.



Map 2 Surrey's Location in the Region

Development Context

Walking through Surrey's City Centre today, one can see and feel the transformation of the once suburban area into the beginnings of a higher-density, transit-oriented community. The changes have been driven by significant public sector investment that has catalyzed private development.

Although development changes toward a higher density downtown began in the late 1990s, the development momentum in the City Centre did not fully emerge until over a decade later with the construction of key public sector developments. These developments include the Central Library that opened in 2011, the RCMP E Division in 2013, expansion of the Surrey Memorial Hospital and Outpatient Care Facility in 2011 & 2013, and the City Hall and Civic Plaza in 2014,

These public sector investment have created a centre of gravity in the downtown core that is attracting residential and office development. Over 4,100 new residential units have been built in the past 10 years and the area has approximately 10 million square feet of office and commercial space. There are currently over 40 major projects in-stream in City Centre. This increasing density is creating a impetus to re-shape the area with a finer-grained road network and greenways to enable safer walking and cycling.

Transportation Infrastructure

Street & Block Structure

City Centre's street network dates back to Surrey's agricultural beginnings based on a one-mile (1,600m) grid of arterials. Many connector roads within City Centre are short and discontinuous, creating very large blocks that service large-format highway-style retail and commercial developments fronted by street-facing parking lots. The absence of a fully completed network and alternatives for through traffic from other parts of the City and other municipalities creates additional congestion within City Centre and a less safe and pleasant environment for pedestrians and cyclists.

Although the current street network is still largely suburban in nature, changes are evident as redevelopment over the past decade has started to help establish the beginnings of a finer-grain street network. Through continued redevelopment, the larger suburban street grid will transform into smaller urban block sizes which will create a more walkable downtown.

Rapid Transit Infrastructure

Rapid transit is an important feature of the City Centre including both the existing SkyTrain stations and future Light Rail Transit (LRT) network.

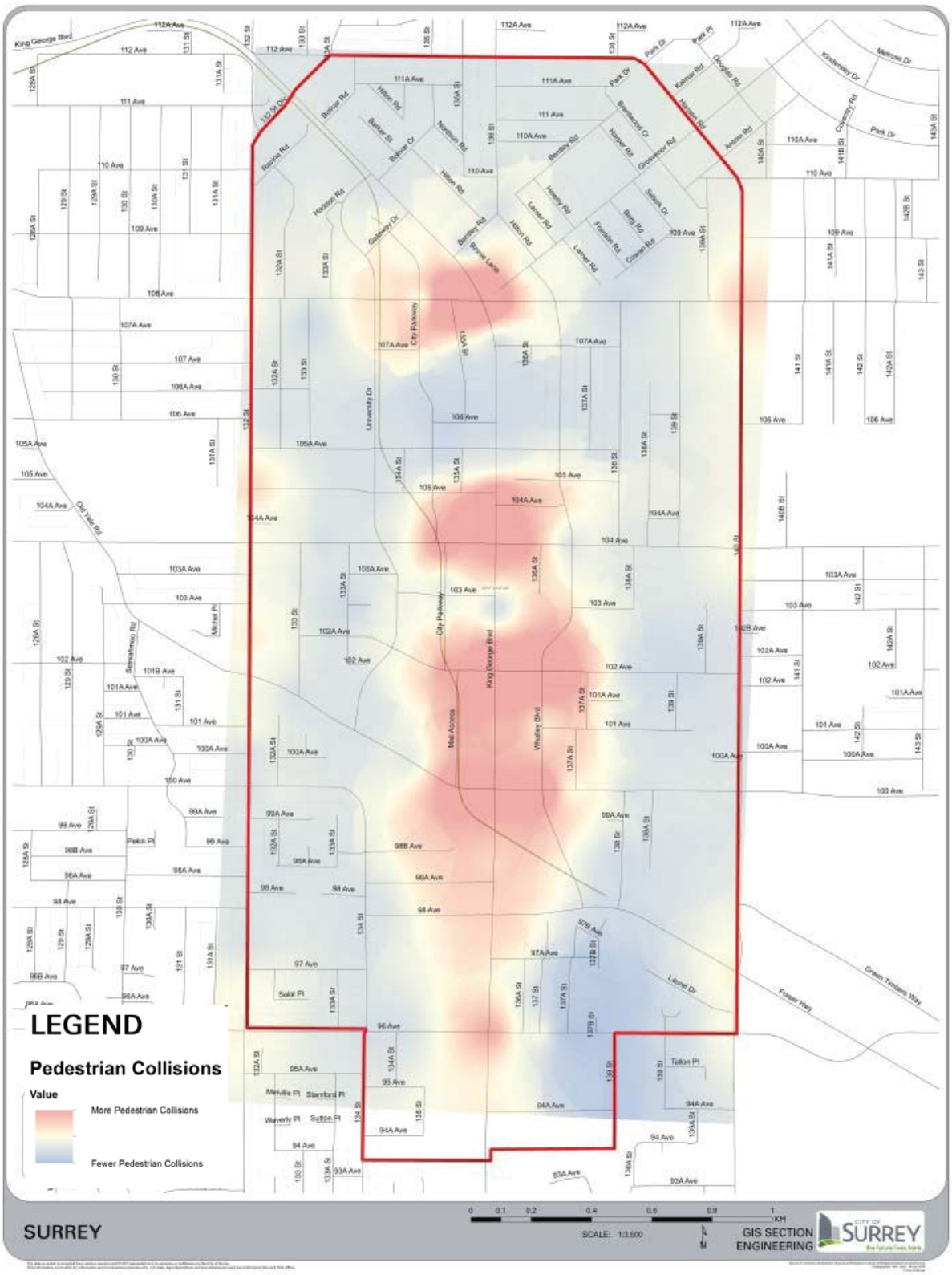
A new LRT network is planned to expand rapid transit service to, and through, City Centre. This network consists of two lines: the 10 kilometre Surrey-Newton-Guildford line and the 17 kilometre Surrey Langley line. Both of these lines will connect thorough the City Centre. To further increase the areas served by rapid transit, the network of Bus Rapid Transit lines will also be extended

Pedestrian and Cyclist Safety

City Centre is currently a study in contrasts. In areas next to the SkyTrain stations there are active transportation facilities and significant pedestrian volumes supporting nodes of mixed uses and higher densities. In other areas there are fewer pedestrian crossings often due to the block size and jaywalking is seen more often.

Sidewalk cycling is also common and a consequence of fast moving traffic and a general absence of all ages and abilities facilities. Per trip cycling injury rates are 50% higher in Surrey than the regional average. Citywide, from 2008-2012 38% of fatalities involved pedestrians, cyclists, or motorcyclists despite these modes accounting for less than 20% of all trips in Surrey. In 2013 there were over 13,200 injured victims on Surrey's roads.

City Centre has a large number of the City's injury hotspots, for example the intersection of 96 Ave and King George Boulevard had 259 casualty crashes resulting in injury in the 5 year period from 2009-2013.. **Map 3** shows concentrations of pedestrian collisions in City Centre in the 10 year period from 2006 to 2015.



Map 3 Pedestrian Collisions in City Centre- 2006-2015

2.3

Natural and Sustainability Features

Geographic Features

Two major natural features give this area a unique and identifying character. These are the area's elevation and its natural creeks systems.

The City Centre is the third highest point of land in Surrey, peaking at an approximate elevation of 105 metres in the north east portion of the plan area. This elevation provides panoramic views of the Fraser River and mountains to the north.

Two fish bearing creeks are located in the downtown area: Bolivar Creek in the northwest and Quibble Creek in the south east. The open water creeks provide a natural amenity for residents, and also contribute to creating a unique "green" identity for the downtown.

Bird-Eye View Looking North to City Centre

District Energy

In 2012 Surrey established Surrey City Energy, a City-owned district energy utility that supplies heat and hot water to high density developments in City Centre. The utility provides energy in a manner that is more efficient than having each building generate its own heat and hot water and eliminates the need for boilers and furnaces in individual buildings.

This will help Surrey to achieve its greenhouse gas reduction targets. New high density developments in City Centre, are required to provide hydronic heating capability, either fully or partially compatible with the district energy system.

Rendering of West Village District Energy Centre

Demographic Profile

Population

According to the 2011 Census, the City Centre population has increased by 68% over the past decade, growing from 13,665 in 2001 to 22,925 in 2011. The share of Surrey's population living in City Centre (approximately 5%) remained relatively constant. According to the City's data, the City Centre population reached 33,790 people in 2015.

Aboriginal Population

Although small in numbers, the largest proportion of Aboriginal residents in Surrey, live in City Centre. According to Statistics Canada, 2011 National Household Survey, Aboriginal people comprise 5.5% of City Centre's population. This accounts for approximately 1,260 people. Comparatively, less than 3.1% of the population in Surrey's other communities identified as Aboriginal.

Household Size

City Centre has smaller households compared to Surrey's average household size. According to 2011 census data, the average household size in City Centre is 2.2 persons per household, compared with 3-person households for Surrey. This is in large part due to the fact that the proportion of City Centre households that include just one person (39%) is nearly double that for Surrey as a whole (20%).

Income

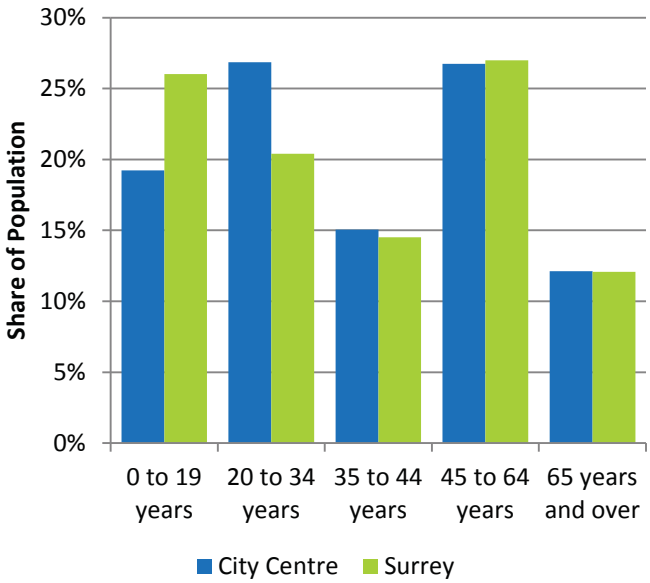
City Centre has the lowest economic family total income (refers to the sum of the total incomes of all family members) compared to all other Surrey communities. In 2010, the average income of economic families in Surrey was $92,446, while the average family income in City Centre was $61,799.

Age Distribution

Similar to other urban areas, the City Centre population includes a significantly higher proportion of young adults, compared to the city average. In City Centre, 18.5% of the population is between the ages of 20-29, compared to the Surrey average (11.3%). Growth in this age category is likely to increase with construction of high rise residential buildings, retail and office construction, and expansion of post-secondary institutions which will bring more working professionals and students into the area.

City Centre has a smaller proportion of children, not unlike other urban neighbourhoods. Only 19% of City Centre residents are under 20 years of age compared with 26% overall for Surrey. Seniors (65 years and over) make up 12% of the City Centre population, the same as in the rest of Surrey.

Age Distribution City Centre Compared to Surrey-2011



2.3

Policy Context

Several City of Surrey strategies have been considered in the development of the Plan. The key strategies are described in the section below.

Sustainability Charter

An overarching strategy that guides the City Centre Plan is Surrey's Sustainability Charter 2.0. It sets out a 40-year vision for sustainability in Surrey to become a thriving, green, inclusive city.

The Charter has eight overlapping themes and outlines the City's goals, desired outcomes and strategic directions looking to the year 2058. The eight themes in the Sustainability Charter 2.0 are:

1. **Inclusion:** A caring community that encourages a sense of belonging and access to opportunity for all Surrey residents to realize their full potential.

2. **Built Environment and Neighbourhoods**: A beautiful, accessible and well-connected city of distinct and complete neighbourhoods that are walkable, engaging and resilient.

3. **Public Safety:** A city in which all people live, work and play in a safe and engaging environment.

4. **Economic Prosperity and Livelihoods**: Continued prosperity and thriving livelihoods and a strong, equitable and diverse economy.

5. **Ecosystems:** Healthy, protected and well-maintained ecosystems and biodiversity.

6. **Education and Culture:** Access to diverse, high quality learning opportunities, and vibrant arts, heritage and cultural experiences for all Surrey residents.

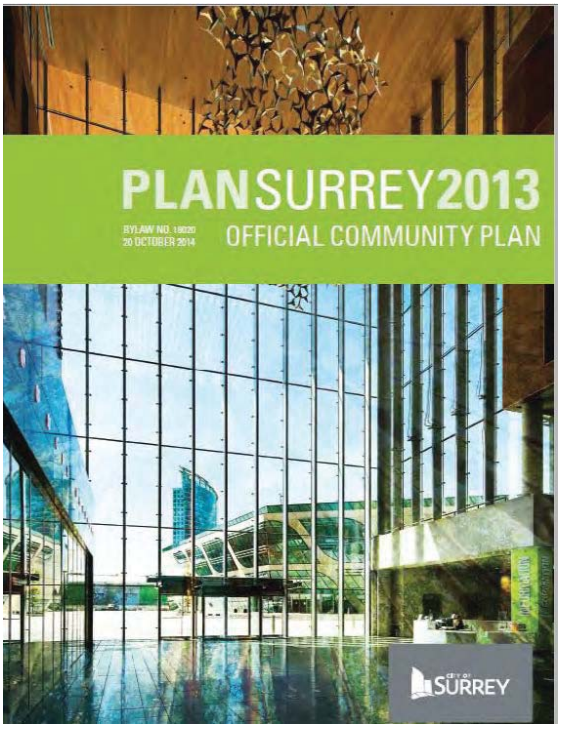
7. **Health and Wellness:** A community in which all residents are healthy, active and connected.

8. **Infrastructure:** Effective infrastructure and services that meet the current and future needs of the city, while protecting the natural environment and supporting urban growth.

Official Community Plan

The **Official Community Plan** (OCP) establishes the role of the City Centre as a major high density centre that supports office development, commercial and business services for the City of Surrey and for the South Fraser Region. Mixed use facilities including commercial, retail, high density residential and civic and cultural facilities such the Central Library, Centre Stage and City Hall are located in the City Centre.

The policy framework set out in the Official Community Plan creates the development direction for the City Centre Plan Update.

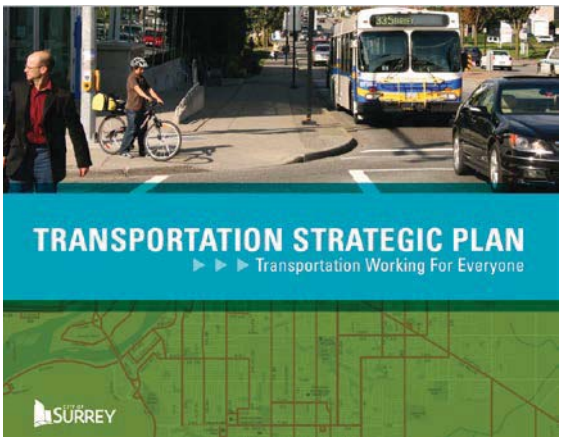


Transportation Strategic Plan

The Transportation Strategic Plan (2008) establishes the long-term vision, objectives, and priorities for the City's Transportation direction. Priorities include increasing the number of walking, cycling and transit trips throughout the City, reducing the over-reliance on the automobile and ensuring there is a robust network for moving goods and services associated with a successful economy.

The Transportation Strategic Plan outlines a hierarchy of considerations to be used to help ensure that the needs and safety of each group of road users are sequentially considered:

1. Walking
2. Transit
3. Bicycles
4. Commercial traffic and trucks
5. High occupancy vehicles
6. Single occupancy vehicles



Public Safety Strategy

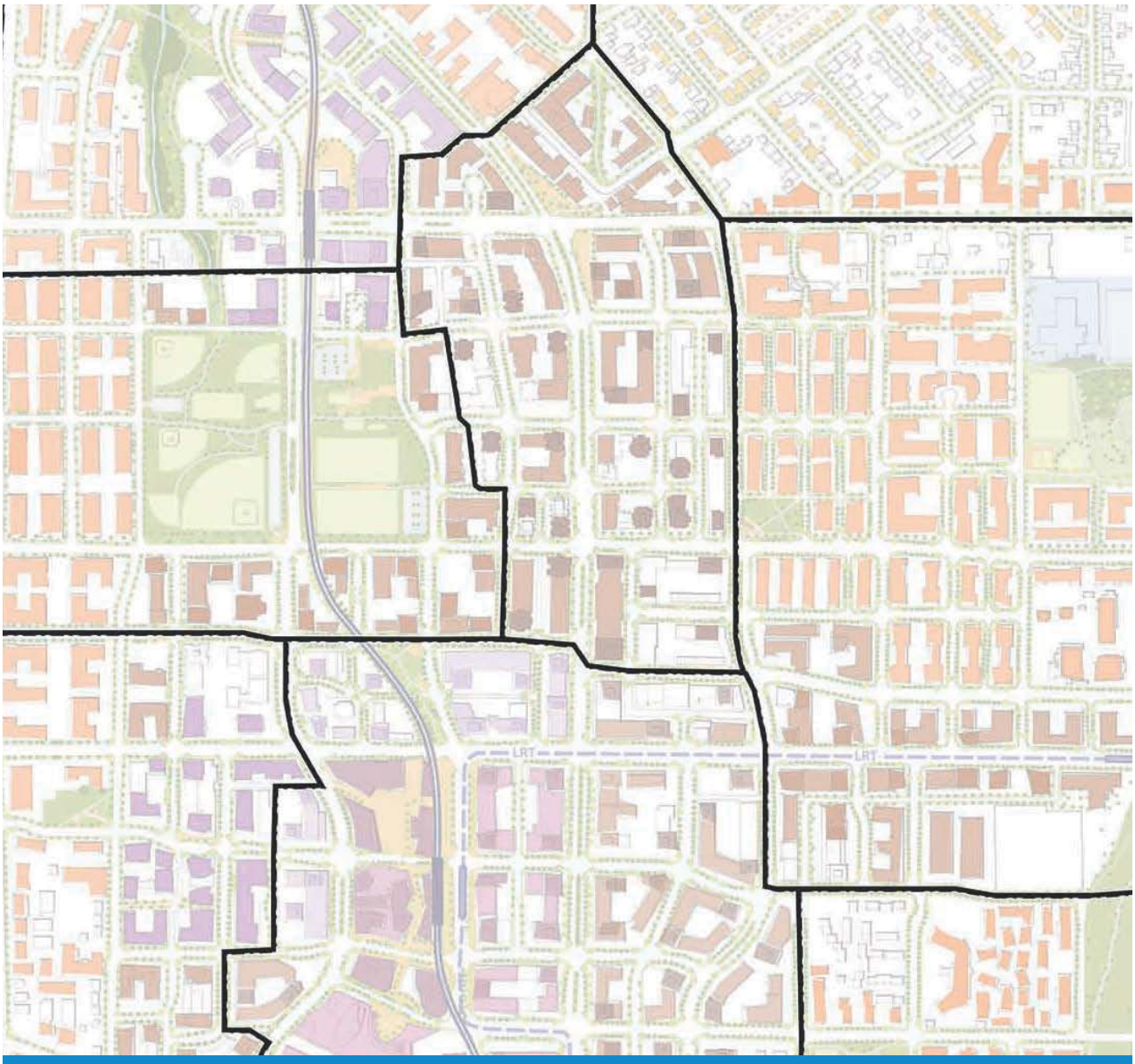
The Public Safety Strategy outlines a vision where everyone feels safe and engaged. The City Centre Plan puts a particular emphasis on those measures that reduce injuries and fatalities, and address both perceived and measured safety barriers to active transportation.

Parks, Recreation & Culture Strategic Plan

The Parks, Recreation & Culture Strategic Plan (2008) establishes the long-term vision, objectives, and priorities for the City's recreation and culture needs. Priorities include parks, recreation and cultural services, facilities and programs that advance a vision of a community where individuals, culture and the environment thrive.

Biodiversity Conservation Strategy

The Biodiversity Conservation Strategy (BCS) identifies the highest priority biodiversity and habitat resources in the City, and outlines management criteria and strategies for conservation and enhancement. This Plan incorporates key components and management criteria from the BCS to advance the goal of a green and sustainable City Centre.



SECTION 3
Districts & Neighbourhoods

3
DISTRICTS & NEIGHBOURHOODS

The plan area has been organized into a number of different neighbourhoods and districts, each with its own emerging identity, function, and scale.
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The following section describes the future vision for the districts & neighbourhoods in City Centre and outlines the future framework of streets, parks and general urban form. It also includes specific policies to promote both the preservation of existing recognizable features as well as development of new and distinct urban character that is unique, authentic and memorable.

3.1 OVERVIEW OF DISTRICTS & NEIGHBOURHOODS

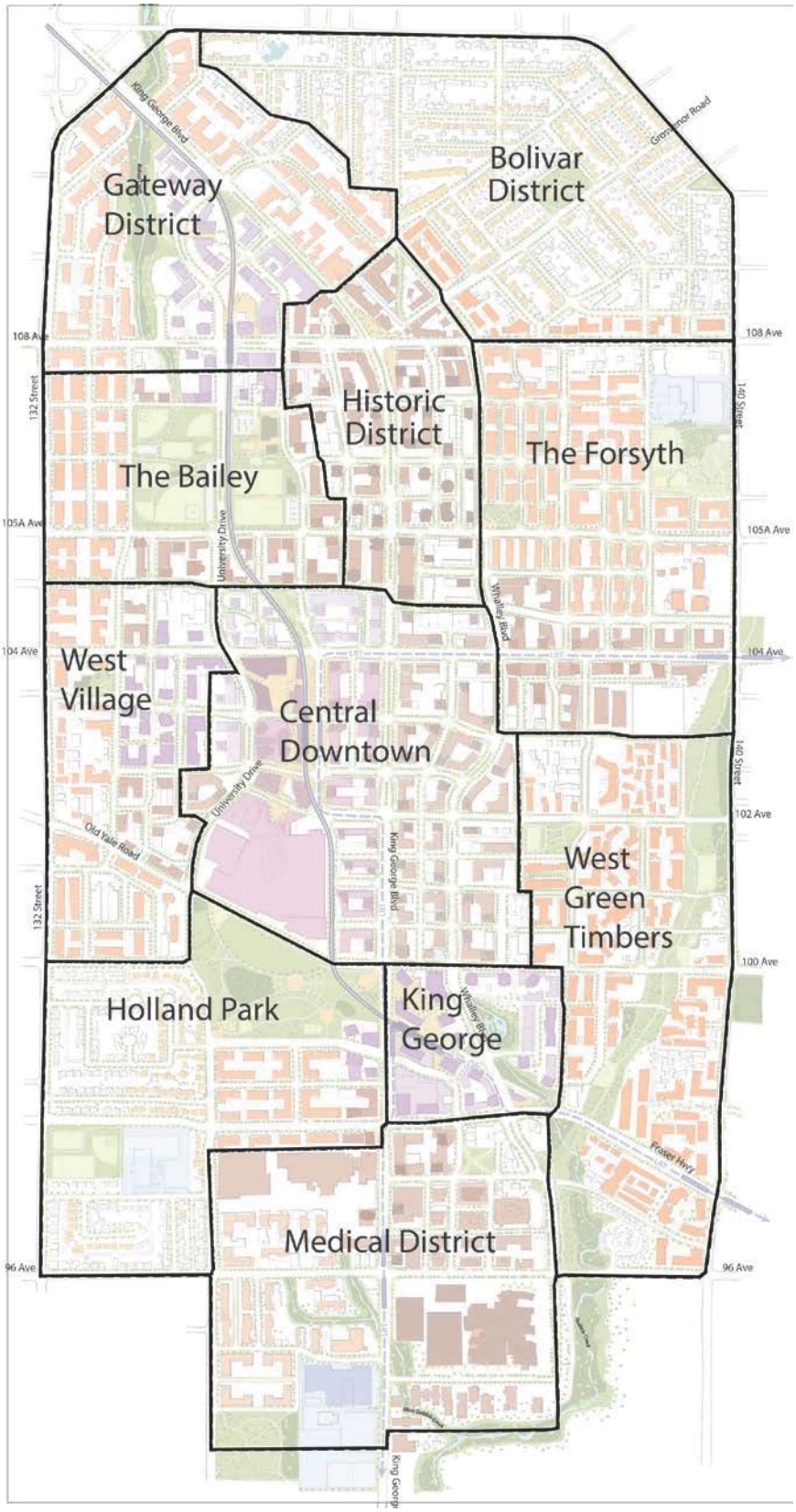
The plan area has been organized into a number of different residential neighbourhoods and mixed-use districts, each with its own emerging identity, function, and scale.

Most memorable and vibrant urban places are understood at a pedestrian scale, providing opportunities to walk, sit, interact and experience attractions that appeal to the senses. However, Surrey's City Centre mainly developed during the post-war era, when car movement was a major priority; this resulted in a downtown landscape that was geographically large and spread out, not scaled for the pedestrian. In order to create a focussed, vibrant, and more urban downtown, the plan area needed to be defined and understood through a smaller scale and framework.

Over the past decade, private and public sector redevelopment efforts in Surrey's downtown have started to shape a framework toward a finer-grained, pedestrian-oriented city centre. Redevelopments are injecting more density into the downtown, as well as breaking up some of the suburban sized blocks and introducing higher quality urban buildings and public spaces.

To continue shaping the City Centre towards one that is truly urban, more compact, and a place with distinct and diverse character, additional policies that promote place-making have been included in the overall city building approach. The plan area has been organized into a number of different residential neighbourhoods and mixed-use districts, each with its own emerging identity, function, and scale.

This section describes each of the districts and neighbourhoods. The policy information in this section should be cross-referenced with the Design Guidelines, Development Policies, Land Use and Density, and Arts, Culture & Community sections of the document.



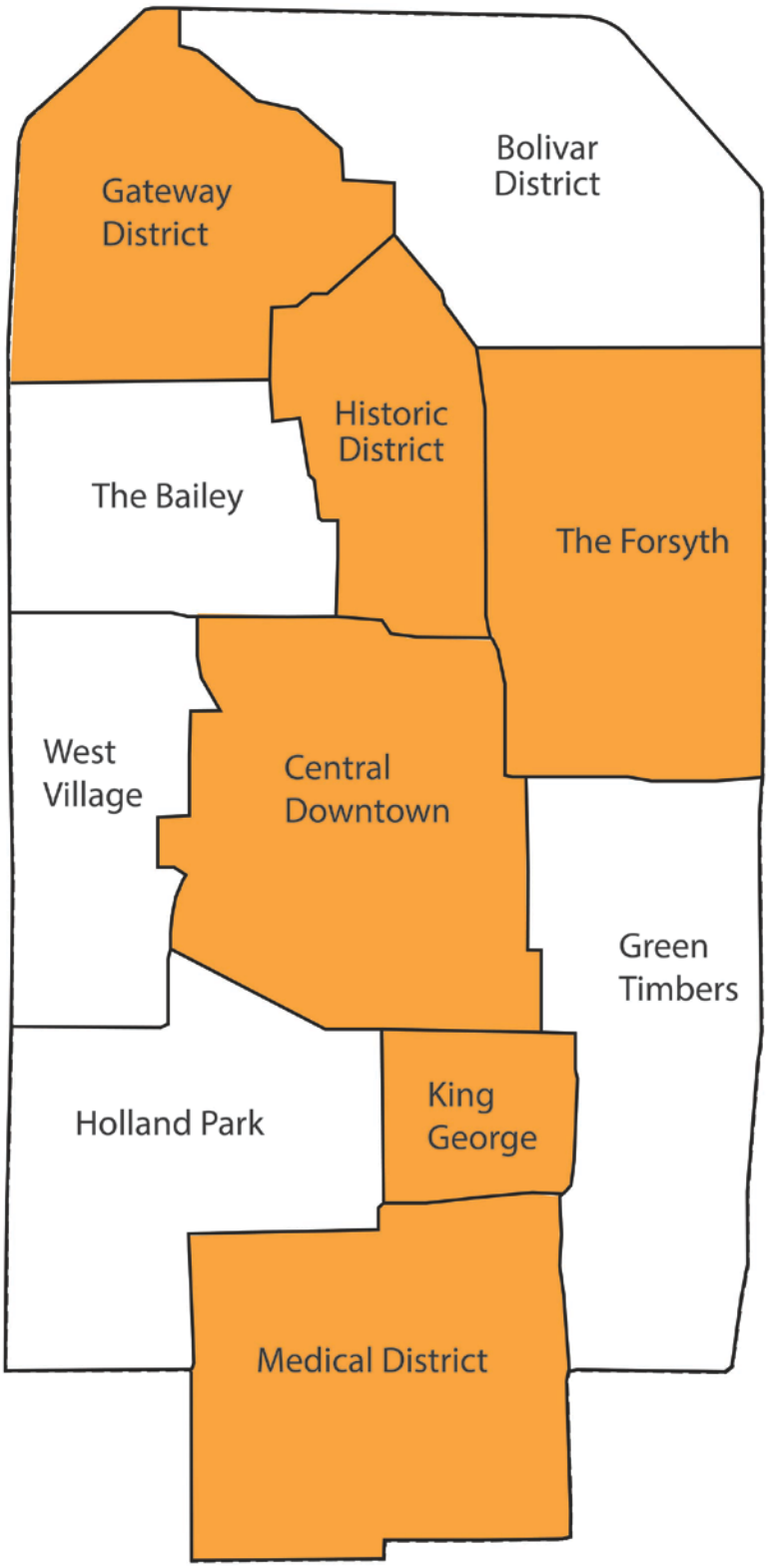
Map 4: City Centre Districts & Neighbourhoods

3.1

3.2
MIXED USE DISTRICTS

There are six Mixed-Use Districts identified in the City Centre Plan.

MIXED USE DISTRICTS
Central Downtown
King George
Gateway
Historic District
The Forsyth
Medical District



Map 5: Mixed Use Districts

Central Downtown

Initially the site of a suburban shopping mall, recreation centre, and low intensity retail uses, this district is starting to transform and take shape as the heart of the downtown. Public and private sector redevelopment has brought in new civic, university, office and retail buildings to this area.

Major changes began in 1994, with the extension of the SkyTrain to King George Station, followed by a large-scale renovation to the mall site in 2000, adding a signature 26-storey office tower and major university (initially Tech BC, then Simon Fraser University) at the podium. Although the changes did not alter the shopping centre surface parking along King George, the renovation did create a more urban and active frontage along 102 Avenue with the construction of a public plaza. The introduction of the office tower and university campus added more foot traffic from students and office professionals, which contributed to more energy and activity at the street level.

More recently, the construction of the Central Library in 2011 and new a City Hall and Civic Plaza in 2014, has further transformed this area. The large urban plaza offers programmable open space for community gathering and large special events. Adjacent to the Civic Plaza, on City Parkway, 52-storey mixed-use tower is currently being constructed. The project includes a hotel, residences, office, educational and retail uses. A restaurant and café will be located at ground level and face directly onto the plaza.

The Surrey Central Exchange bus loop, a large surface parking lot and a recreation facility are located between the civic buildings to the north and the university & mall site to the south, These create a large physical barrier between the civic uses to the north and educational and retail uses to the south.

Vision

The Central Downtown District is envisioned as having the highest densities in the heart of the downtown with a vibrant civic, educational, entertainment and cultural focus. This area is a compact, highly walkable area, less than a square kilometre (about 800,000 m^2.) in size, where a critical mass of activity will facilitate major economic, cultural, and institutional exchange.

The public realm will provide high quality public spaces, and a large civic plaza for major events. Local office and institutional sector employees, students, residents and visitors will support restaurants, galleries, shops and services along a network of pedestrian-oriented streets. Increased amenities for residents will include plaza space, public art, seating, farmers markets, food carts and festivals.

A major transit hub will be located at the core of the district, building on the existing Surrey Central Exchange and SkyTrain station with the addition of light rail transit (LRT). The suburban style bus loop will be reconfigured into a new on-street transit exchange, as the bus layover and ice arenas are relocated away from the central core.

The presence of significant new university buildings will expand in the Central Downtown, creating a stronger campus identity and student energy at street level. Research buildings with large floor plates will have active retail street frontages and transparent storefronts to engage the pedestrian with the innovative internal uses.

Key Sites or Components

1. City Hall
2. Central Library
3. Civic Plaza
4. Hotel, Residential & Kwantlen Polytechnic University mixed use development
5. Future public art on plaza
6. Simon Fraser University-Energy Systems Engineering Building
7. Centre Block & Relocation of Ice arenas
8. Surrey Central SkyTrain station and Future City Parkway LRT Station
9. Future SFU expansion site
10. SFU, Central City Office Tower
11. Central City Mall
12. Future Public Art on King George Boulevard
13. Future Retail infill

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**2,740**	**9,900**	**22,500**
Employment	**9,360**	**14,650**	**30,500**

Central Downtown District

3.2

Urban Design & Redevelopment

Centre Block

The " Centre Block" is located between the Civic Plaza and Central Ave to the north and the Central City Plaza and 102 Ave to the south. It includes the North Surrey Recreation Centre (which includes two ice arenas, a swimming pool and fitness facility), a large parking lot and suburban style bus loop. The ice arenas have reached the end of their lifespan and are being relocated to a site near the Scott Road SkyTrain Station in Surrey.

The Centre Block will be redeveloped into a higher density mixed-use precinct. Redevelopment will facilitate the completion of a north-south pedestrian corridor, and an on-street bus exchange. The north-south pedestrian corridor will meander through the Centre Block and vary in width to include large and small plazas. The plazas will include amenities such as seating, bike racks, public art, and specialty paving. The edges of the plaza will be animated with strong, four to six-storey building podiums and active uses at grade.

The existing bus loop will be reconfigured into an on-street transit exchange. The completion of key east-west streets, Central Avenue (103 Avenue) and 102A Avenue, will facilitate bus drop off along 102A Ave and bus pick-up along Central Avenue. The bus layover facility, which is currently located within the bus loop, will be relocated within close proximity to the Centre Block.

University Precinct

Although the plan does not identify a location for a university precinct, it is expected that the university presence will form a core identity for this district. With the Simon Fraser University (SFU) expansion, the area will see a significant presence of student activity in the area, and higher pedestrian volumes. The student activity will be further intensified with Kwantlen Polytechnic University (KPU) presence, which will be located in the 3-Civic Plaza building.

Expansion for SFU could be realized as stand-alone academic buildings and/or as mixed use buildings with private sector partnerships. It is anticipated that the university brand presence will be increased through signage, banners and buildings. Regardless of the expansion model, it is anticipated that the ground floor interface will be animated with more active uses, and could consider a 6-storey podium.

Consideration should be given to providing a robust network of walkway connections between university buildings student destinations such as transit areas, coffee shops etc. Wayfinding signage should be included as the university precinct emerges.

City Parkway

City Parkway will extend the Centre Block pedestrian spine into a car free zone from 102A Avenue to Central Avenue including an LRT station next to Surrey Central SkyTrain Station. This pedestrian street will include high quality architectural detail and green tracks. The station area is planned as a signature LRT station with the termination of the Fraser Highway line, and intersection of the L-line along City Parkway.

Development fronting onto the station will be required to provide active ground floor retail uses to support the pedestrian environment at the station. Active merchant uses, public art, seating and street trees will contribute to a vibrant and inviting interface at the station.

Interface along the LRT station includes intensification of retail uses with special guidelines for a " Merchant Zone" and " Amenity Zone". These guidelines include an additional row of street trees, and a furnishing zone that includes amenities such as seating, planning and bike racks. This is shown conceptual on the next page, City Parkway LRT Interface sketch.

City Parkway LRT Interface

LRT Platform Area

Outside Row Trees
+/-2 metres

Outside Row Sidewalk
+/-2 metres
Saw-cut concrete finish

Merchant Zone
4.5 metres to 8 metres
Includes walkway, merchandise display, cafes, weather protection and amenities

Amenity Zone/Inside Row of Trees
+/- 2 metres
Includes trees, in-ground planting and amenities such as public art, bike racks, seating, and garbage receptacles

The Boulevard

King George Boulevard, between 102 Avenue and 104 Avenue, will emerge as a true " Boulevard" , with the low intensity commercial and parking lot uses redeveloping into a street-facing downtown shopping area. Long term, the mall parking lot site will be redeveloped with underground parking and higher density mixed use development that integrates with the existing retail.

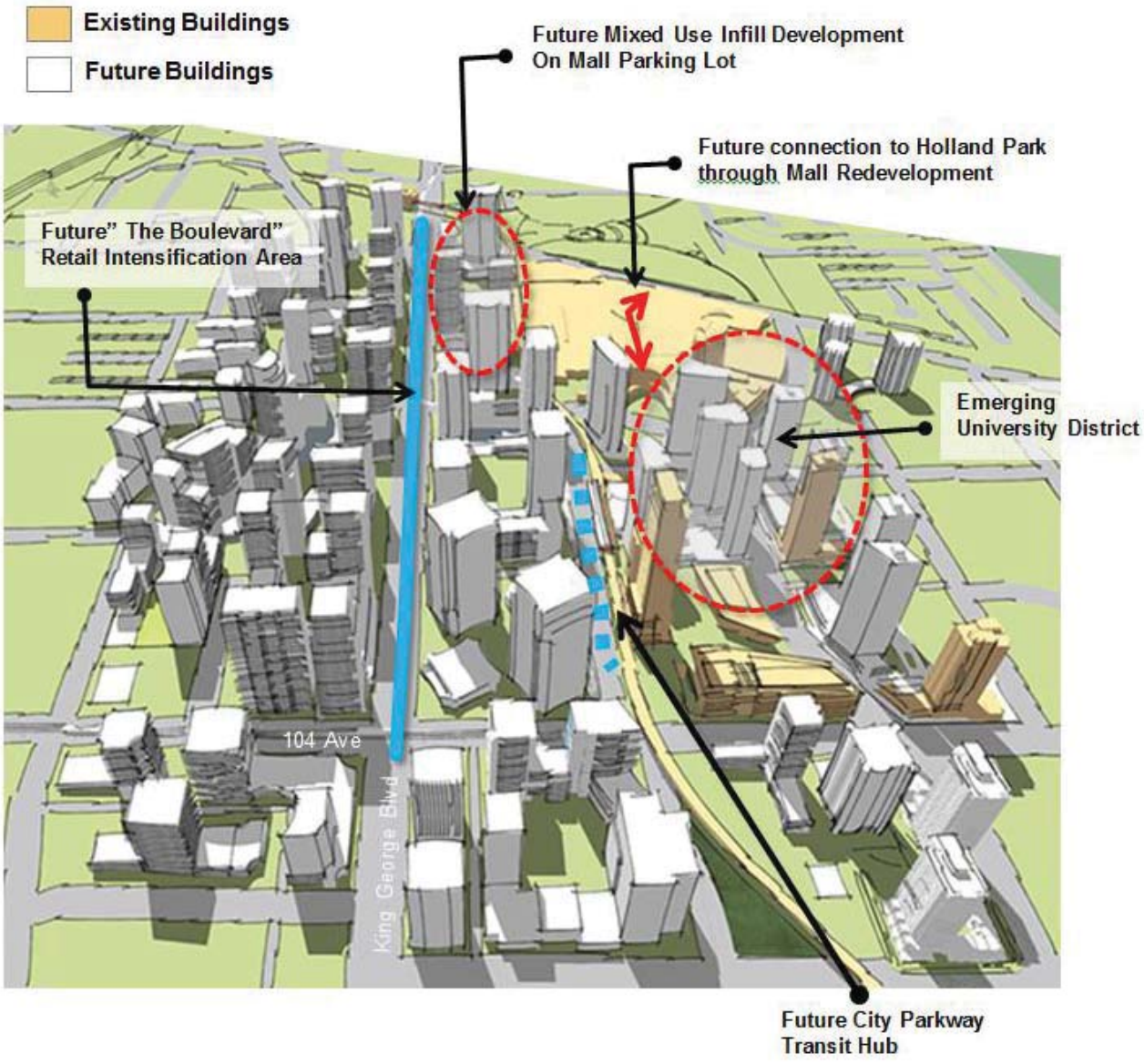
To create street enclosure along this corridor, a strong four-storey streetwall with a contemporary design aesthetic is recommended at the base of large towers. Storefront widths are recommended to be 15 metre maximum to promote an active and interesting pedestrian environment.

As part of humanizing King George Boulevard, a significant public art installation will be located in the centre of King George Boulevard median, in the residual road right-of-way area created by the narrowing of the street as the LRT turns onto 102 Avenue. As well, segregated cycle tracks will be introduced along King George Boulevard.

Central City Mall Redevelopment

Over the longer term, the Central City Mall property will redevelop to create a site that has improved interface and connection to Holland Park as well as a broader range of mixed of uses. The retail uses in the parking lot areas along King George Boulevard will intensify and include office and residential components. The redevelopment would provide mixed-use buildings with retail at grade, office on 2nd and 3rd stories, and residential above.

The interface along Holland Park will also be improved with redevelopment of the parkade structures into high density residential buildings and a redesign that creates direct connection through the mall site to Holland Park.



Potential Future Scenario Showing 3D View of Central Downtown Looking South

King George District

Originally the site of a large park-and-ride facility and small hotel, this area is now undergoing a major transformation into a new high density, transit-oriented development.

Beginning in the early 2000's this area started to see change. A multi-phase, mixed use residential and commercial project immediately north of the skytrain station was approved by Council in 2005, and construction was completed in 2011. Phase one included the construction of a residential tower at the corner of 100 Avenue and King George Boulevard. Subsequent phases of the development provided two additional residential towers, small scale commercial space, a plaza, and public art.

Currently under construction are two residential towers to the east of the existing three towers and to the south, a mixed use office, retail and residential development. Phase one of the development includes an office tower with 160,000 sq. feet of office space, and 25,000 sq. feet of commercial space. Future phases will include additional office space, a large component of retail space, and residential towers.

Vision

King George is envisioned as a secondary office and entertainment node with high density office and residential mixed uses including a large component of retail. With its proximity to rapid transit lines, high quality amenities and natural space, this node will attract new residents, office and related uses. It will be an important economic, social and environmentally sustainable centre in Surrey's downtown.

A commercial "high street" will extend along 98 Avenue from King George Boulevard to Fraser Highway. It will feature prominent green space, public art, bike racks, seating areas and community gathering points to encourage a vibrant and walkable street-front and transit plaza. Movie theatres, restaurants shopping, and Holland Park will provide entertainment and leisure opportunities for both residents and employees.

As a major junction point for transit modes- Skytrain, LRT, Bus, it will be an area with high pedestrian volumes and street activity. Planned extension of the rapid transit into Langley from this station will allow this area to emerge as its own unique district as significant density is built and transit expansion occurs.

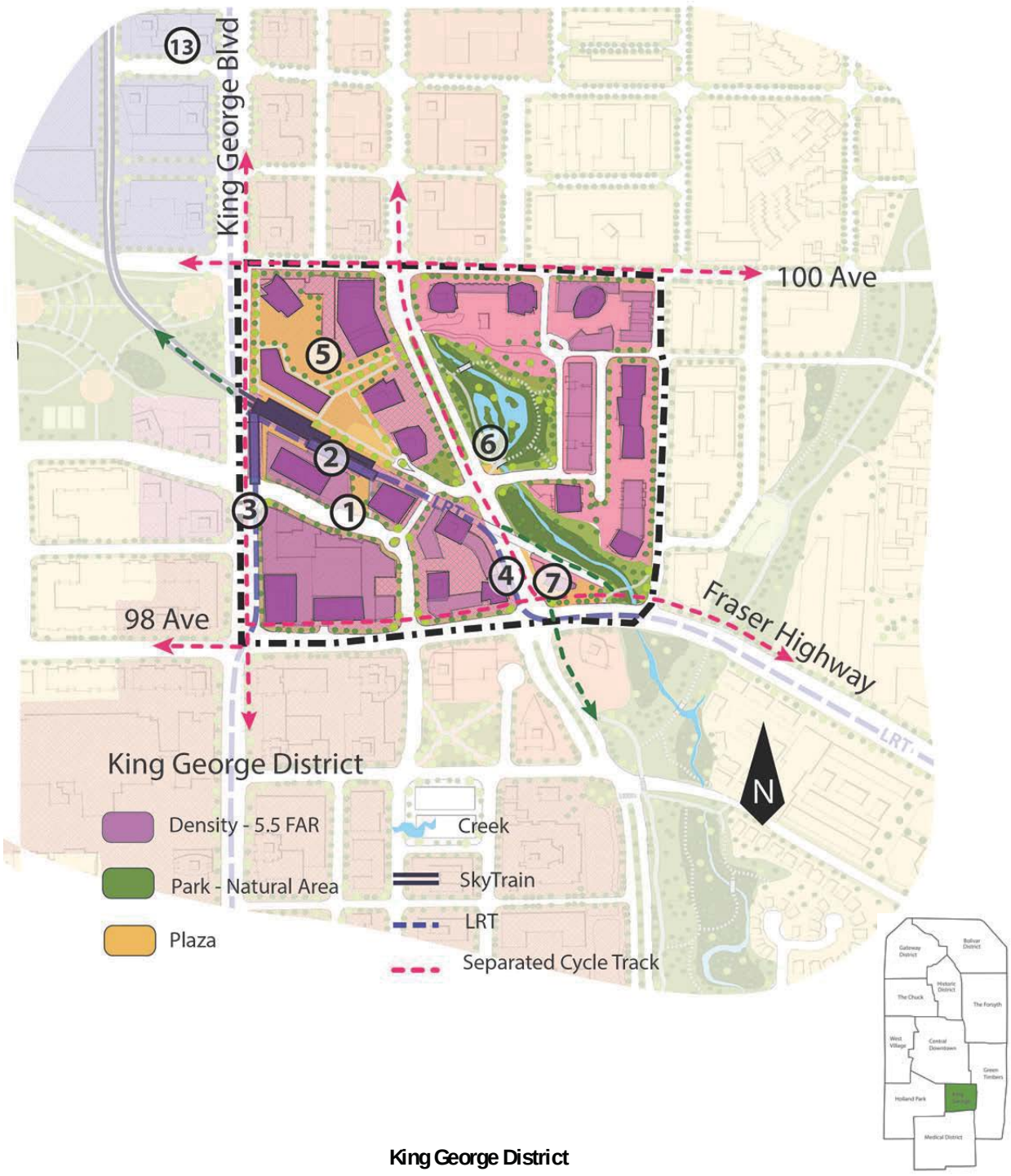
The south east area of the district will be defined by natural features of Quibble Creek and associated public viewing areas as well as the Quibble Creek District Energy Centre.

Key Sites or Components

1. Commercial High Street
2. King George SkyTrain Station
3. Future LRT L-Line
4. Future LRT Fraser Hwy Line
5. Public Art
6. Future Quibble Creek viewing area
7. District Energy Centre

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**4,800**	**7,500**	**9,000**
Employment	**860**	**3,400**	**4,000**



King George District

Urban Design & Public Realm Features

Commercial High Street

A commercial high street will be formed along 98B-Avenue and will create the heart of the district. It will be energized by high pedestrian volumes created by residents from the surrounding high density residential towers, employees from office & retail buildings, and transit commuters. The retail uses at the ground will be supplemented with high quality amenities such as benches, bike racks, trees and in-ground planting to create a vibrant pedestrian realm. Movie theatres are planned on the second storey and will provide much needed entertainment uses to the area.

Transit Hub

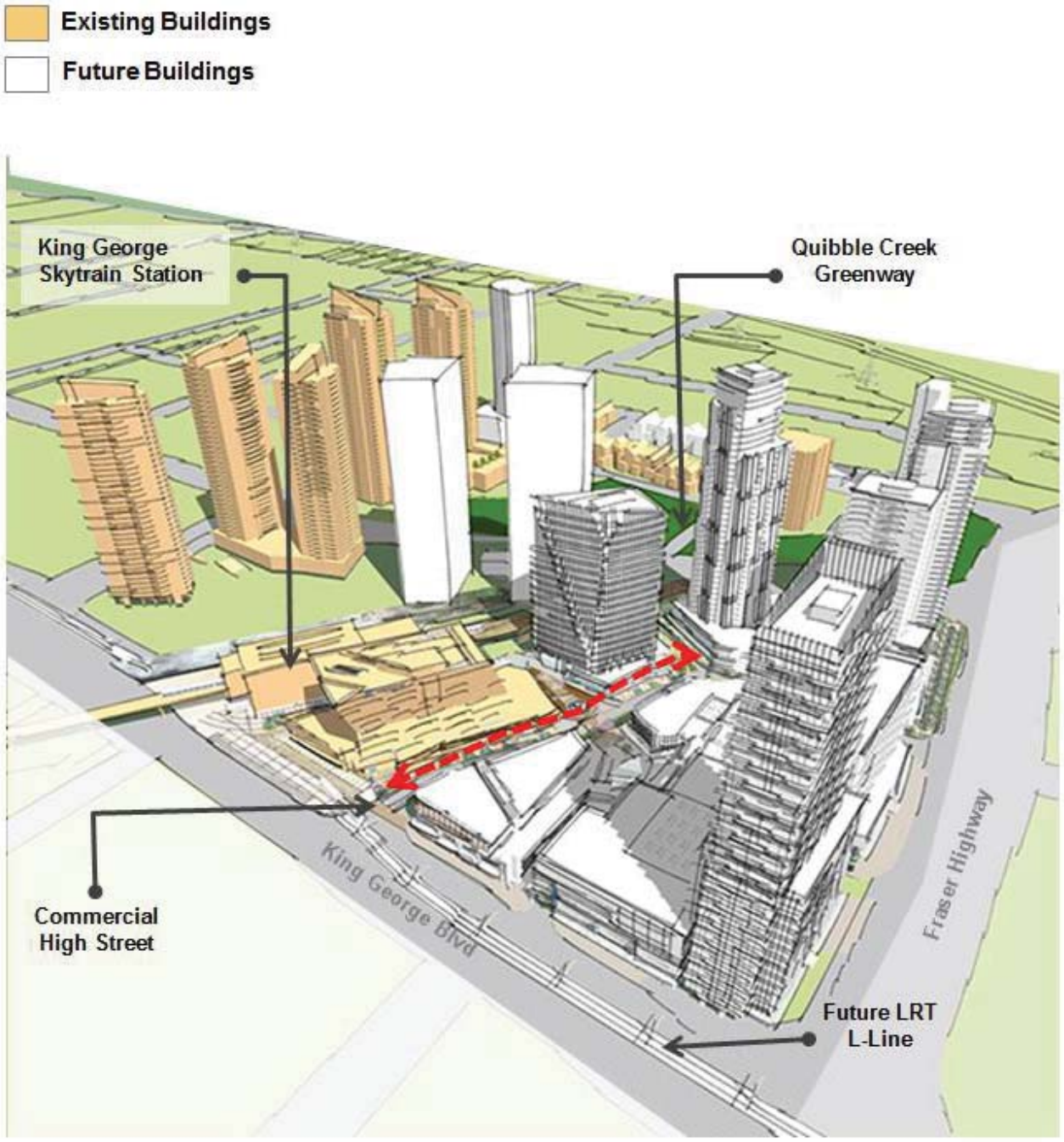
The station area will be a "hub" of transportation activity, with the convergence of skytrain, bus and Light Rail Transit (LRT). Two LRT lines will intersect in this district next to the existing King George SkyTrain Station: the Fraser Highway Line and the Newton leg of the L-line. The platform for the Fraser Highway line will run along the north side of the Coast Capital Office Building, and the platform for the L-line will be located along King George Boulevard in front of Coast Capital.

Quibble Creek

A distinguishing natural feature of the King George District is Quibble Creek, an open water creek system that runs north-south through the eastern side of the district. Amongst the high density urban environment, residents, employees and visitors will be able to view "salmon in the city" at a creek viewing area. This will create a unique urban-nature connection as the high rise residential, office and retail built environment integrates with the natural open water creek and riparian area.

Quibble Creek District Energy Centre

Quibble Creek District Energy Centre will be located at the south east corner of the district and will identify this area as a sustainable district. The City-owned district energy utility will supply hot water and heat to the high-density residential, commercial and institutional buildings in this area. This system will distribute this hot water through a dedicated pipe system to heat the buildings in the King George District.



Potential Future Scenario Showing 3-D View of King George District Looking North-East

Gateway District

Located at the top of Peterson Hill, this district is the northern gateway into the City Centre. A creek and riparian area flows north-south through the district which is visible from the skytrain line that runs through a single family area leading into the office node. Four storey apartments line the western hillside, giving way to a higher density mixed-use office node at the top of the hill.

Largely a single family residential neighbourhood in the past, this area started seeing higher density redevelopment with the introduction of the skytrain in 1994 and the construction of the Gateway Station Tower project. The nineteen-storey office tower provided new public amenities including a plaza and open space with fountains, seating and public art. Lower intensity commercial uses currently exist on the south side of 108 Avenue and north east side of King George Boulevard.

More recently the area surrounding the station has seen the construction of mixed use development as well as a new five-storey office/retail development. This project will include 135,000 square feet of commercial floor area with an urban format supermarket, drug store, bank, and small retail with four stories of office space above the retail. A future phase of development will include high density residential towers to the north of the office and retail site.

Vision

This district is envisioned as a smaller office node known for its views and natural areas. Mixed use office, retail and residential uses will continue to emerge around the skytrain station creating a thriving office and retail environment. The densities will taper down away from the central core and with apartment and townhouse neighbourhood along Bolivar Creek. The area on south side of 108 Avenue will redevelop into a mixed-use development with retail at grade along 108 Avenue that integrates with the station area development.

Views into, and out from, the district are a key feature of this district. Its location and higher elevation will provide opportunities high rise developments to have mountain and river vistas looking northward from the district. Looking into the district, a pattern of four to six storey apartments along King George Boulevard hillside, will keep heights lower along the hillside to allow clear views of the Gateway node at the skytrain station.

Bolivar Creek, which runs north-south through the western portion of the district, will provide a unique natural amenity for the residential development straddling each side of the river bank. The eastern corridor of residential will be connected to the mixed-use node though a large pedestrian bridge that runs over the creek. Pocket parks, on either side of the bridge, will include viewing areas, seating, public art and other amenities.

Key Sites or Components

1. Station Tower & Plaza
2. Office and Retail Site
3. Bolivar Ravine Park
4. Gateway SkyTrain Station
5. Bolivar Creek & Ravine

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**3,700**	**7,000**	**14,000**
Employment	**2,200**	**3,000**	**4,000**

Gateway District

Urban Design & Public Realm Features

High Density Node

Intensification of office, retail and residential density will continue to emerge around the skytrain station creating a thriving office and retail environment. Redevelopment along 108 Avenue at the Gateway node will incorporate a four storey podium form with retail at grade along 108 and City Parkway.

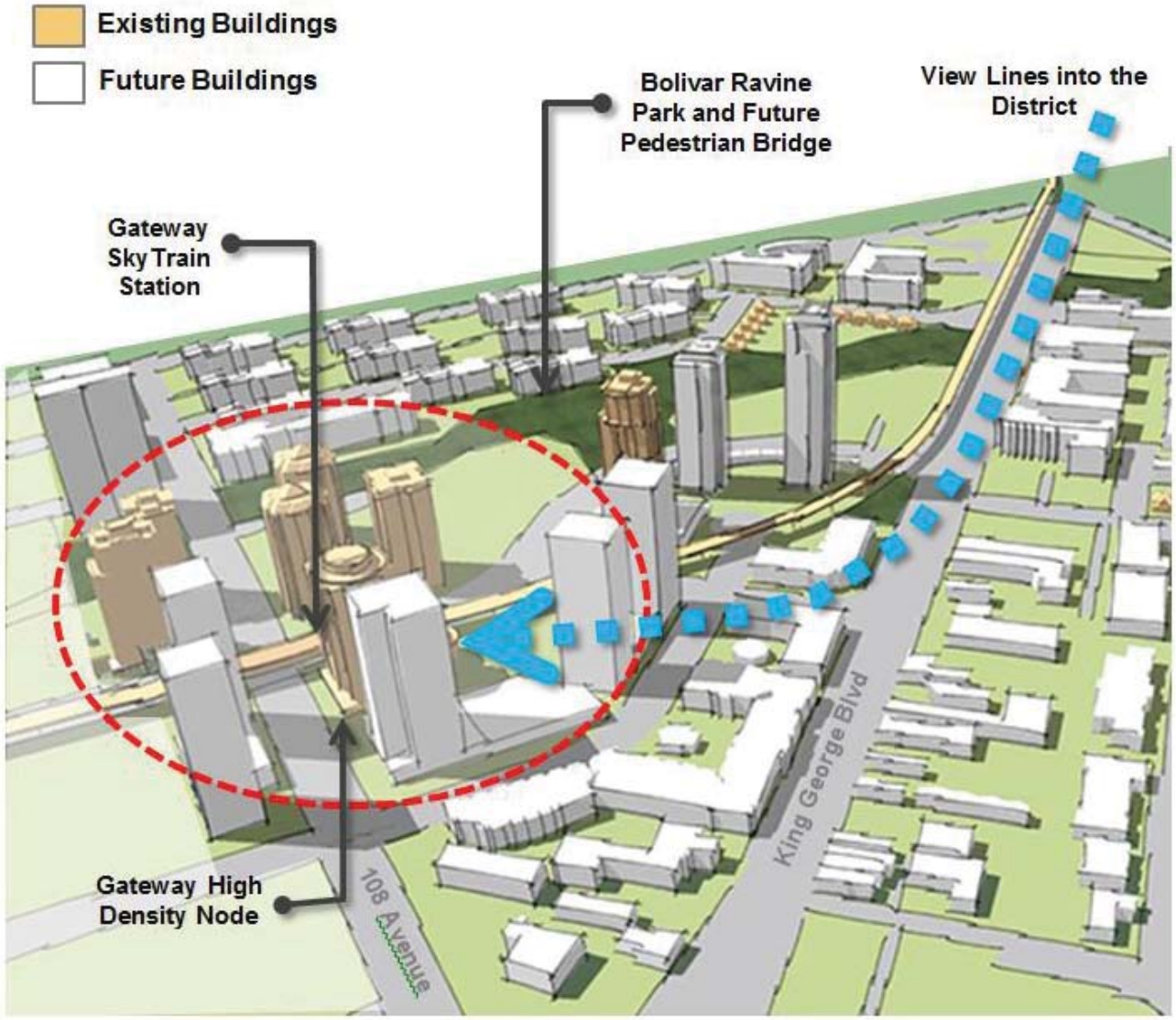
The uses at the station area will consider a mix of land uses such as active retail, residential, entertainment and attractions that generate demand during mid-day, evenings, and weekends.

View lines into the Plan

Four to six storey apartments along King George will create open views to towers at top of the hill, and emphasize the office node. This will create an open and clear view-scape toward the high density node at Gateway Skytrain station and the landmark tower on the south east corner of King George Boulevard and 108 Avenue.

Bolivar Ravine Park

Bolivar Ravine Park, a future park, will be formed with two green spaces on the east and west side of Bolivar Creek, connected by a pedestrian bridge. The bridge and a pathway along the eastern side of the creek will connect two residential areas on either side of the creek to the Gateway Skytrain Station. The bridge will also incorporate opportunities for public art, as well as natural creek viewing areas.



Potential Future Scenario Showing 3-D View of Gateway District Looking North-West

Historic District

Small scale and eclectic "mom and pop" businesses and a mid-century modern built form, gives this district its unique character. Today, shops along northern portions of King George Boulevard are made up of small-scale retail uses with narrow storefronts. These include multicultural grocery stores, specialty meat shops, a European deli, as well as ethnic restaurants such as African, Jamaican, Japanese, Vietnamese, Mexican and Salvadoran. An African business area is also emerging at the north end of the district, where one can find groceries, restaurants and retail goods that are run by people who self-identify as people of African descent.

Historically, a small commercial area emerged in this District, originating in 1925 with Whalley's Corner Gas at the intersection of Grosvenor Road, Ferguson Road (108 Avenue) and King George Boulevard (then Highway). A mid-century modern design aesthetic emerged for this area during this time.. Mid-century modern influence can be seen through elements such as flat roof lines, neon signs, low profile suspended canopies, simple clean building lines with muted colour palettes.

Remnants of the original buildings are most evident in the northern portion of the Historic District, along Binnie Block, and King George Boulevard between 108 Avenue and 105A- Avenue. These areas have predominately narrow storefronts that are between 7 to 10 metres wide and building heights between 1 and 2 stories that use clean, simple design lines and materials.

The pedestrian realm in the District is currently weak due to a lack of continuous retail frontages and the poor interface between pedestrians and automobile traffic. There are gaps in pedestrian interest due to sections of vacant lots between the original smaller storefronts. These vacant lots increase in number toward the southern end of the Historic District.

Northern portions of the district allow on-street parking, which helps buffer against the vehicular traffic. However, the lack of appropriate pedestrian amenities, as well as wide traffic travel lanes along King George Boulevard, creates an unpleasant pedestrian experience.

Vision

Building on the historic roots of the area, the vision for the Historic District is to support a pedestrian-oriented eclectic shopping experience with a continuous commercial and retail edge with pedestrian amenities. The historic, mid-century modern feel will be preserved and reinforced through small storefronts, building façade treatment and materials, public art, and signage.

New developments will incorporate the 1950's character by using elements that reflect a mid-century modern design aesthetic. These elements include flat roof lines, vertically oriented windows, cantilevered overhangs, and clean and contemporary lines (see Design Guidelines for more details).

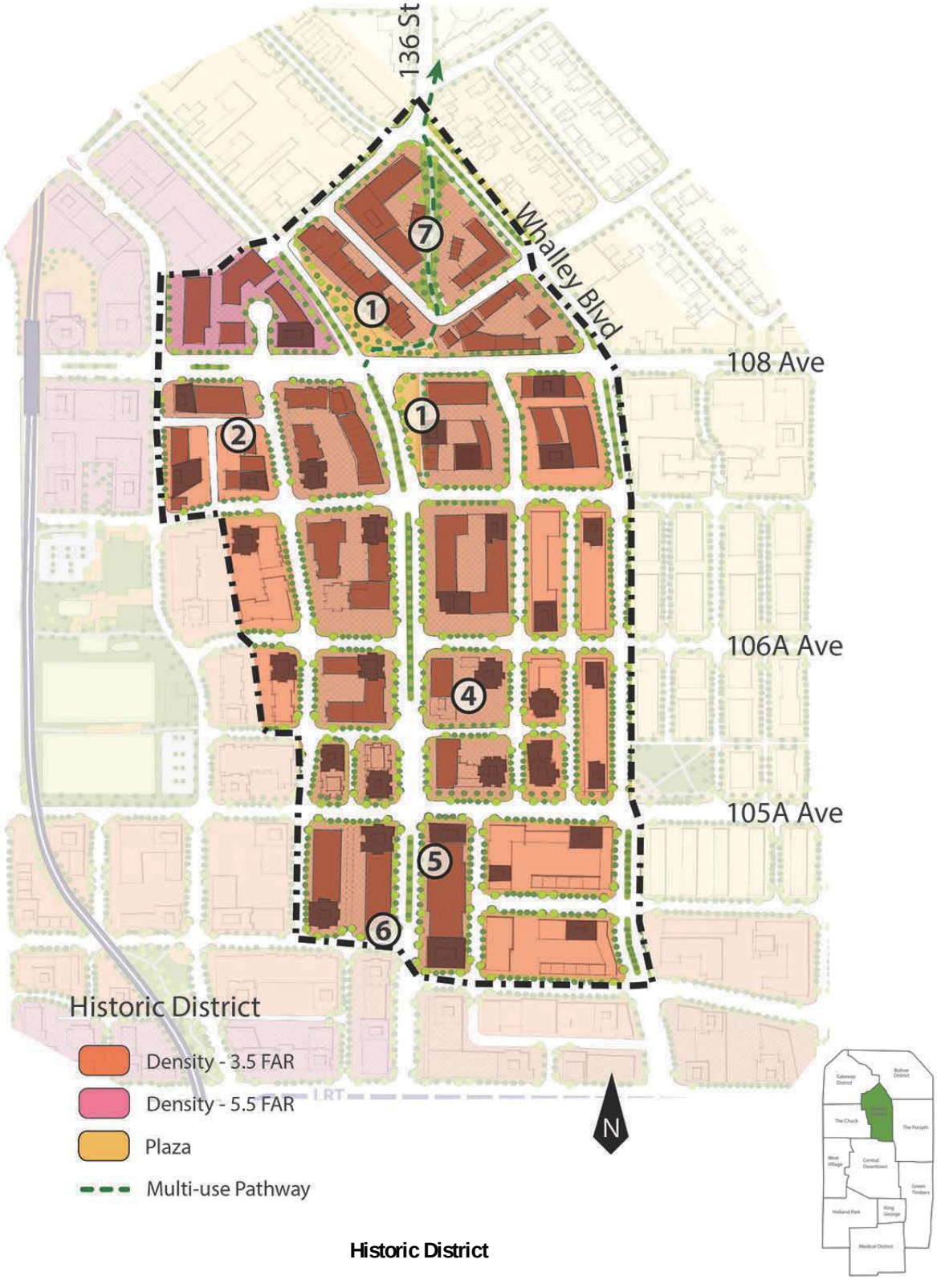
Redevelopment will bring new amenities to improve the pedestrian environment. These will include weather protection on new buildings, new benches and planting in the boulevard. The northern portion of the district will allow on-street parking and segregated cycle tracks that will create a buffer the pedestrian from vehicular traffic, and also create an opportunity for new cycle amenities and beautification.

Key Sites or Components

1. **Whalley's Corner and Binnie Block**
2. **St. Mary's Ukrainian Greek-Orthodox Church**
3. **The Dell Shopping Centre**
4. **Round-up café Sign**
5. **Rickshaw Sign**
6. **City Centre Artist Space.**
7. **Grosvenor Trail**

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**200**	**4,000**	**10,000**
Employment	**1,300**	**1,600**	**3,500**



Historic District

3.2

Urban Design & Public Realm Features

Public Art

Public art will consider reinterpretation of the area's history in a contemporary way. There will be opportunities for both pedestrian scale and large scale public art installations at Whalley's Corner plaza. For example, pedestrian-scaled elements may include old fashioned 50's gas pumps at Whalley's Corner Plaza and also larger scale gateway installations that may consider re-interpretation of neon lighting in the public art. A large scale iconic art installation may be placed at appropriate view corridors toward the plaza area.

Artist Space

Renovations to a City owned building at 10660 City Parkway will provide programming and administrative space for a number of local, not for profit arts organizations. The creation of this arts space will complement existing cultural amenities in City Centre including the Surrey Urban Screen, Centre Stage theatre and the public art walk. Artist Studios will be permitted in the C-8, C-15 , C-35 and CHI zones

Mid-Century Modern Design Aesthetic

Mid-Century Modern Design elements should be preserved for renovations, and incorporated for new developments (see Design Guidelines for key elements)**.** Natural materials such as brick, stone, and wood combined with concrete, and glass to create a complete façade are encouraged. Patterns for materials can include stone or brick in coursed ashlar, stacked bond or common bond patterns that were commonly used in the mid-century modern era.

Historic Signs

Two of the rare surviving examples of neon illuminated signs that dominated the King George downtown commercial corridor are the Round Up Café and Rickshaw Restaurant signs.

Preservation or reuse of historic signs for new business will create a memorable image for the historic district. Two signs from the mid-century period have survived in the District: the Round Up Café and the Rickshaw Restaurant signs. The reuse of these historic signs will provide a sense of longevity and permanence for the business, and reinforce the historic character.

Projecting Blade Signs above the canopy and use of neon tubing is encouraged for signage along King George Boulevard for new developments

Heritage Revitalization

The following sites are protected heritage sites and are registered on Surrey's Heritage Inventory

- St. Mary's Ukrainian Orthodox Church
- Goodmanson Building (Round Up Café)
- Rickshaw Sign

Heritage Interpretation Opportunities

Potential Heritage interpretation opportunities exist at the following sites:

- **Whalley's Corner** -related to Arthur Whalley and the original 5 corners. Special street blades signs exist. There is opportunity for public art in the plaza related to the history, and also interpretation signage.

- **Dell Shopping Centre** - related to the significance of one of Surrey's oldest shopping centres.

- **Bolivar Hatcheries** -related to the Bolivar Family and their hatchery. The hatchery was quite a presence in the 40's and 50's as people drove down the King George Highway. It had a neon sign with fighting roosters on either side.

- **Cameo Theatre-** Part of Binnie Block, this building was built in 1954 and provided an important entertainment destination for the community. Heritage re-interpretation is recommended with redevelopment of the site. Opportunities could include re-creation of the " Cameo" signage and incorporation into new development.

Pedestrian-Oriented Retail

Active retail uses will be required along King George Boulevard, 108 Avenue and Whalley's Corner Triangle. Smaller storefronts and transparent windows providing views of the shop interior that create interest for the pedestrian will be encouraged. The maximum frontage recommended for each individual occupant on the ground floor is 10 metres. If a larger floor plate occupant is part of a redevelopment, the total amount of frontage of the large frontage occupant should not exceed 10 metres and should be interspersed with other retail or service uses along street edge. (see **Design Guidelines** Section).

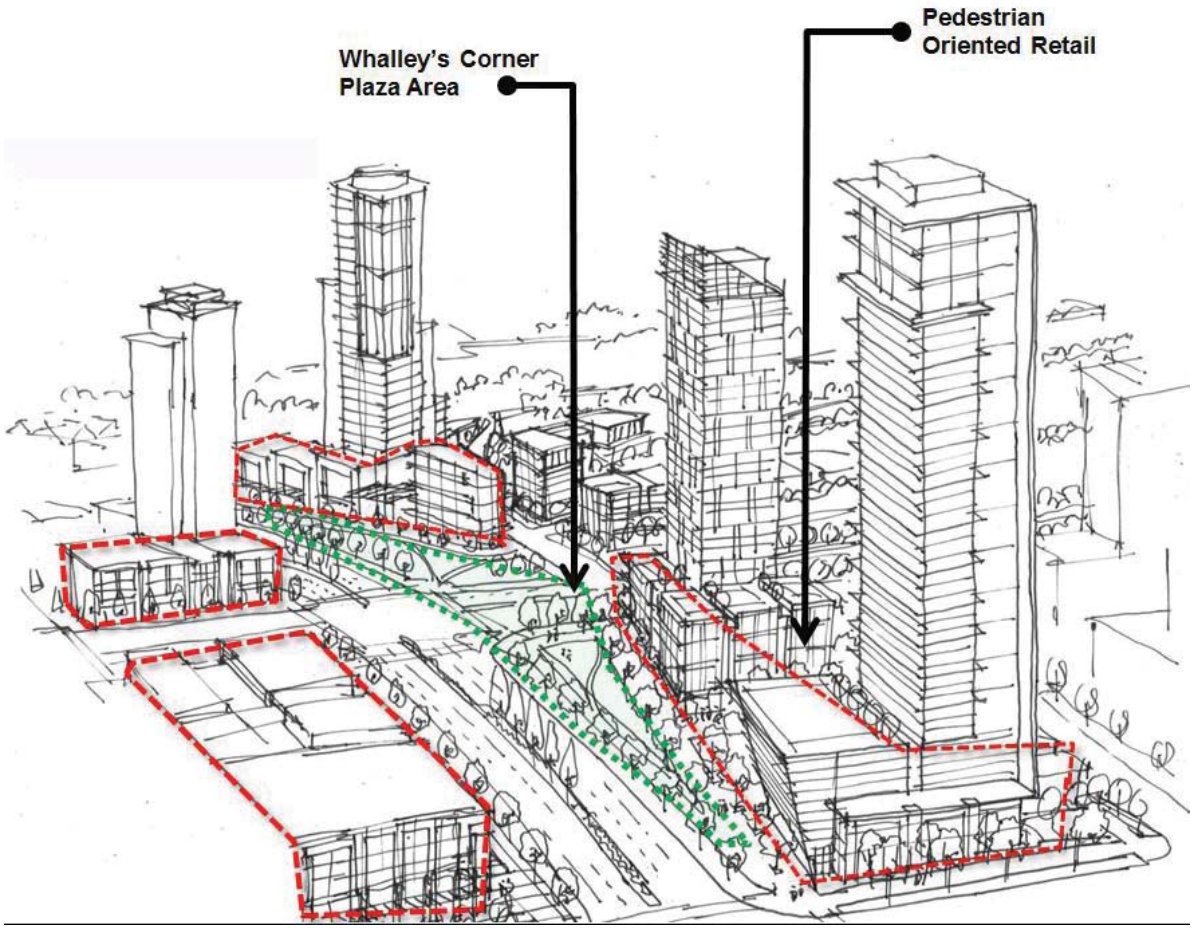
Street Blade Signs

Special Street Blade signs to identify Historic District (installed at Whalley's Corner) –as a visual element that identifies the district.

On-street and Off-street Parking

Parking relaxations may be considered for interim tenant improvements on smaller sites with little redevelopment potential. The proposal must comply with small storefront and active use policy (see Land Use & Density and Design Guideline Section) to be considered for parking relaxation.

On-street parking currently exists in parts of the Historic District. Additional on-street parking areas may be considered on a site by site basis with redevelopment to support small-scale commercial. On-street parking and segregated cycle- lanes & amenities will act as a buffer for pedestrians, screening them from traffic along King George Boulevard. No new surface parking lots will be permitted along the street edges with active retail uses.



Conceptual Sketch of the Future Historic District

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The Forsyth

The Forsyth District, located at the highest topographic height of City Centre, is predominalty a single family neighbourhood with pockets of apartment housing. The residential core is bound with retail corridors at the north and south end.

The existing apartment housing stock was largely built during the 1980s and 1990s forming large block sizes and very few walking connections. More recent infill development in the single family area is creating newer 4- storey apartment forms that engage with the street and include pathways that provide improved pedestrain connections. Newly constructed apartments with retail at ground level have been built at the north end of the district, to create the beginings of a mixed use corridor along 108 Avnue.

The corriodor at the south end of the district, 104 Avenue, is lined with low intensity retail and office uses in strip mall format with small surface parking lots. There are high traffic volumes along the corridor, because it is a key connector between Highway 1 and the City Centre, as well as Guildford Town Centre and City Centre. This corridor is planned to accommodate light rail transit in the future, so redevelopment will be re-shaped along the transit line and stations.

Vision

The Forsyth is envisioned as a medium density residential neighbourhood of apartments and townhouses, connected to a neighbourhood parks, and schools with a Light Rail Transit (LRT) corridor running along 104 Avenue at the southern end of this district. The 104 Avenue corrodor will evolve into a dense urban rapid transit corridor lined with active commercial uses, surrounded by a medium density residential neighbourhood that supports transit.

Higher intensity retail and small scale office nodes will form around LRT stations at Whalley Boulevard and 140 Street. North-south pathways, roads and green lanes will provide improved penetrability and connection from the residential area into the LRT station areas. Additional through-roads connections along 104A-Avenue and 103 Avenue will provide important alternative routes to move traffic east-west.

The residential core of the neighbourhood will be family-oriented and highly walkable because of its fine grained street network green lanes and pathway system. A unique feature of this neighbourhood will the increased green lane density compared to other neighbourhoods. These green lanes will likely be off-set because they will be achieved through incremental development that integrates with the existing development blocks. The additional green lanes will give this neighbourhood a high degree of walkability, and the off-set lane pattern will create a “meandering” feel to give this neighbourhood a unique charm.

Forsyth Park will be a key focal point for this neighbourhood. It will be a large integrated-use neighbourhood park that will add to the existing open space at Forsyth Road Elementary resulting in over 4 hectares of greenspace. A small park located at 105A Avenue Park will be within walking distance of the future 104 Avenue LRT station and higher density multi-family and mixed use developments. This mini-park will provide a contemporary outdoor place that supports play and social interaction for the neighbourhood.

Key Sites or Components

1. Future Light Rail Transit Corridor and retail intensification along 104 Avenue
2. Future LRT Station
3. Quibble Creek Greenway
4. Hawthorne Greenway
5. Forsyth Park
6. Future Rowberry Park

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**2,700**	**5,200**	**15,000**
Employment	**700**	**1,000**	**1,500**

Forsyth District

3.2

Urban Design & Public Realm Features

Medium Density Residential Heights

This District is located at the highest topographic height of City Centre. This topography effectively increases the height of the buildings, because their visibility is increased from surrounding areas. Given the higher elevations of the Forsyth, the maximum building height in this neighbourhood is proposed at 12 metres (4 storeys).

LRT Station Areas

Higher intensity retail and small-scale office nodes will form around LRT stations at Whalley Boulevard and 140 Street. The ground floor interface will include active retail storefronts at ground level and office buildings at 2nd or 3rd storeys. The uses at the station area will consider a mix of land uses such as active retail, residential, entertainment and attractions that generate demand during mid-day, evenings, and weekends.

Open and permeable interfaces are encouraged at the station areas, while also providing clear visual delineation queues between sidewalk and station platform areas. Public art opportunities along the corridor as well as at the station areas will be encouraged. In areas where the right-of-way is constrained, structural soil cells may be required for trees.

Off-grid Green Lane Pattern

A distinguishing feature of this district will be a higher density of green lanes that will be established through an off-grid alignment pattern. Although this pattern is not preferred, it may be necessary to achieve connectivity in established areas of the residential neighbourhood. These existing sites were built in the 1980s and 1990s and did not provide the finer-grained pedestrian connectivity the plans aims for today. As a result, the remaining development parcels will provide green lane connections as incremental redevelopment occurs. In some cases, the lanes may need to be off-grid to integrate with existing development blocks.

East-West Bike Lanes

104 Avenue has a more constrained road right-of-way than the other LRT corridors and it will not be possible to provide cycle tracks on opening day. To facilitate some opportunity for an east-west movement, segregated cycle tracks will be introduced in the project to widen 100 Ave. They will also be included along 105A Avenue as this road is built through redevelopment, as well as along 104 Ave as redevelopment provides additional right-of-way.

Potential Future Scenario Showing 3-D View of the Forsyth District Looking South East

3.2

Medical District

This district is emerging as a medical and technology area which will support Surrey Memorial Hospital, other high tech offices and supportive housing. Medical office buildings are largely concentrated at the southern end of the District close to Surrey Memorial Hospital and older single family houses are located at the northern end closer to Fraser Highway.

Several supportive housing developments are also located in different areas within this district. These include seniors care facilities, Kinsmen Lodge and Laurel Place and supportive housing developments including an addiction recovery supportive housing development.

Large institutional employers in this district include Revenue Canada Building and Surrey Memorial Hospital. Surrey Memorial Hospital underwent a major expansion of the Emergency Room and added a Critical Care tower in 2011. A new medical office building (City Centre 1) was constructed in 2015, the second phase is under construction and future phases are proposed.

An underground, high-capacity fiber optic network is planned to support data-intensive research and innovation across a range of public sector users. This advanced infrastructure will not only help support, but also attract new medical and health technology uses.

Vision

This area will form a dense medical and health technology office district, having the highest concentration of innovation and health related offices in the city, as well as mixed-use residential and supportive housing. Companies will co-locate with a major hospital, health institutions, research and technology firms, a health technology accelerator and incubator centre and research university to create a health tech and innovation focus within Surrey's downtown.

High quality public realm including amenities will support office and health sector employees, visitors and residents. Active ground floor interfaces for office buildings will include retail uses such as coffee shops and amenities such as benches, high quality landscaping and public art.

A key north-south linear connection through the centre of this district will be established along 137 A-Street. It will connect people from the southern end at the hospital through to the northern district at the King George Skytrain Station. This connection will feature pedestrian-oriented amenities such as a double row of trees along the sidewalk, benches, and public art. An urban neighbourhood park will be located along the linear corridor. It will provide employees, residents and visitors with access to nature and green space.

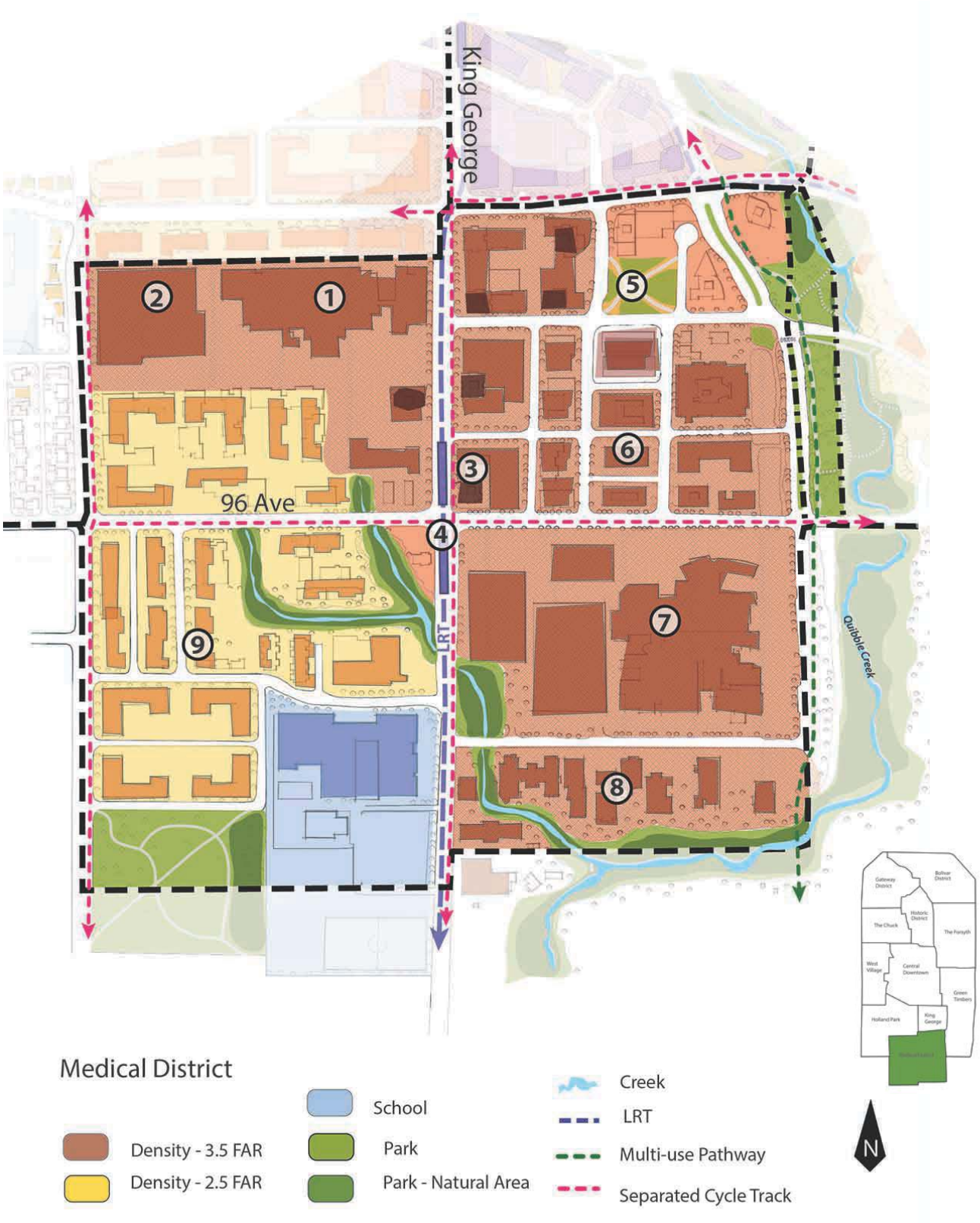
Neighbourhood to the west of the hospital will redevelop into a medium density residential pocket that will include care facilities and other supportive housing uses adjacent to south Quibble Creek.

Key Sites or Components

1. Revenue Canada Building
2. Future redevelopment potential on parking lot area
3. Historic North Surrey Medical Building and Parking Lot Redevelopment with HRA
4. Future LRT and 96 Ave Station
5. Park in Medical Precinct
6. Health Tech Office Intensification Area
7. Surrey Memorial Hospital
8. Specialized Health Services
9. Future Residential Density Intensification Area

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**2,600**	**5,500**	**10,000**
Employment	**8,000**	**10,000**	**13,500**



Medical District

3.2

Urban Design & Public Realm Features

High Tech Office Building Area

New office developments in this district will be built with a heavy six-storey podium and up to 12-storey tower above. The office frontages should include active frontages such as coffee shops or retail to help activate the public realm. The developments should also provide high quality public amenities that consider the needs of residents, office and medical sector employees, and hospital patients and visitors.

Fiber Optic Network

To support the attraction of high tech companies and research in this district, an underground infrastructure including a fibre-optic cable system that can transport very large data files at fast speeds is planned to be installed. The City is working with partners including BC Net to extend the CANARIE fibre network, currently servicing SFU Surrey, to the Surrey Memorial Hospital

Revenue Canada Building

There is future infill redevelopment potential for the parking lot areas of the Revenue Canada Building.

Residential Component

Most of the residential buildings in this district are located at the north end. However mixed-use developments in this district may consider inclusion of a residential component in order to provide additional residential vibrancy in the office area. The residences will provide utilization of the public spaces beyond business hours. Development should consider a mix of land uses such as active retail, residential, entertainment and attractions that generate demand during mid-day, evenings, and weekends.

Historic North Surrey Medical Building

An interesting feature of this modern, high tech district is the historic North Surrey Medical Building (9656 King George Boulevard). It was built in 1969, and designed by architect Peter Cole. The building reflects the mid-century modern design aesthetic, constructed from simple concrete material and glass, with a muted colour palette. The style embraces the weightiness of masonry forms, exaggerates a sense of mass, and uses unusual geometric shapes.

The building has been recommended for a heritage evaluation to determine the present condition of the building. Increased density on this site would be permitted through a Heritage Revitalisation Agreement, to preserve the building and allow redevelopment to a mixed-use development on the eastern parking lot portion of the site. The new development would accommodate under-ground parking for the existing and new development.

LRT Station at 96 Avenue

An LRT station is planned at 96th Avenue and King George Boulevard along the L-Line. This station will provide residents and employees with increase access to Surrey Memorial Hospital and office uses.

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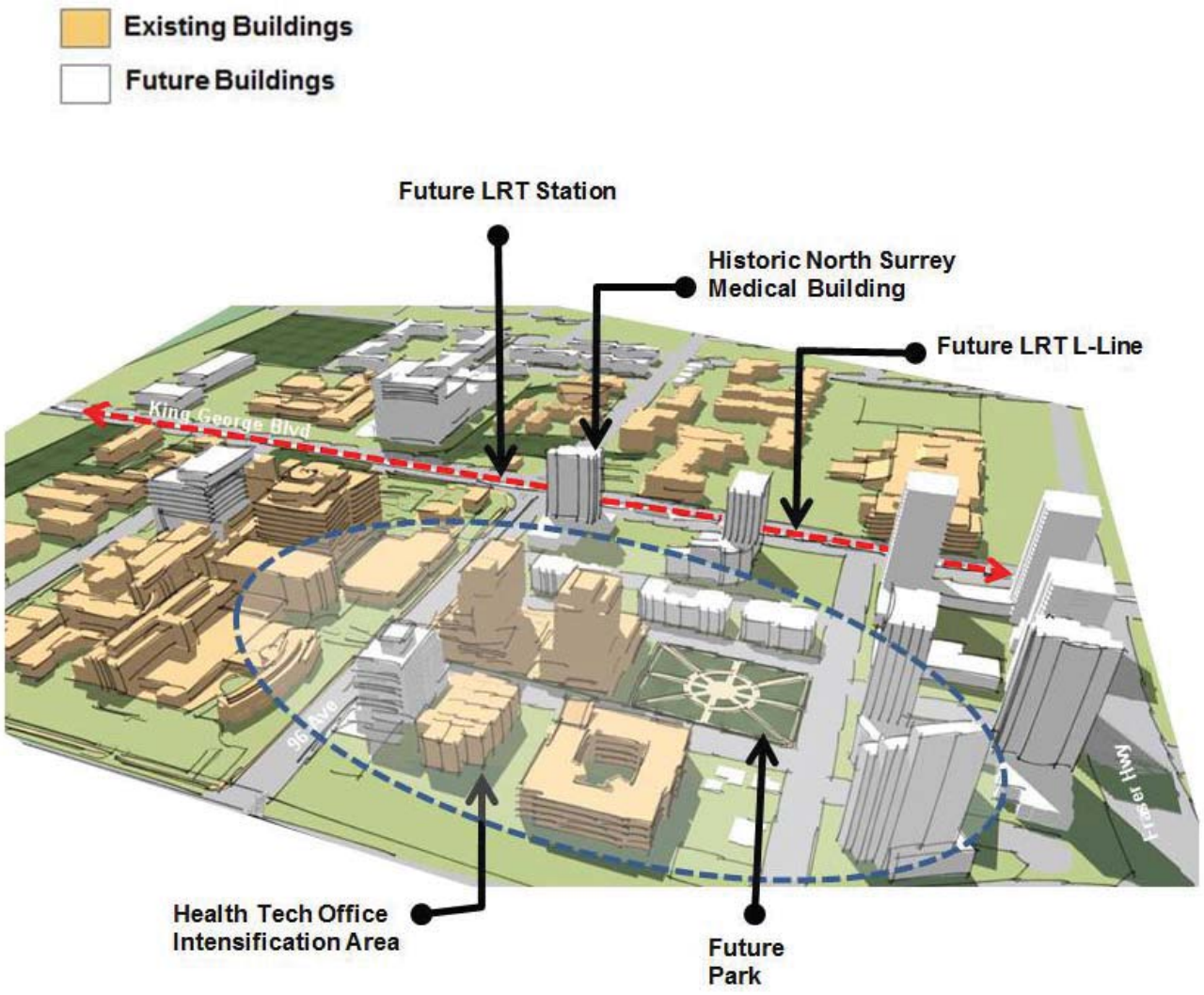


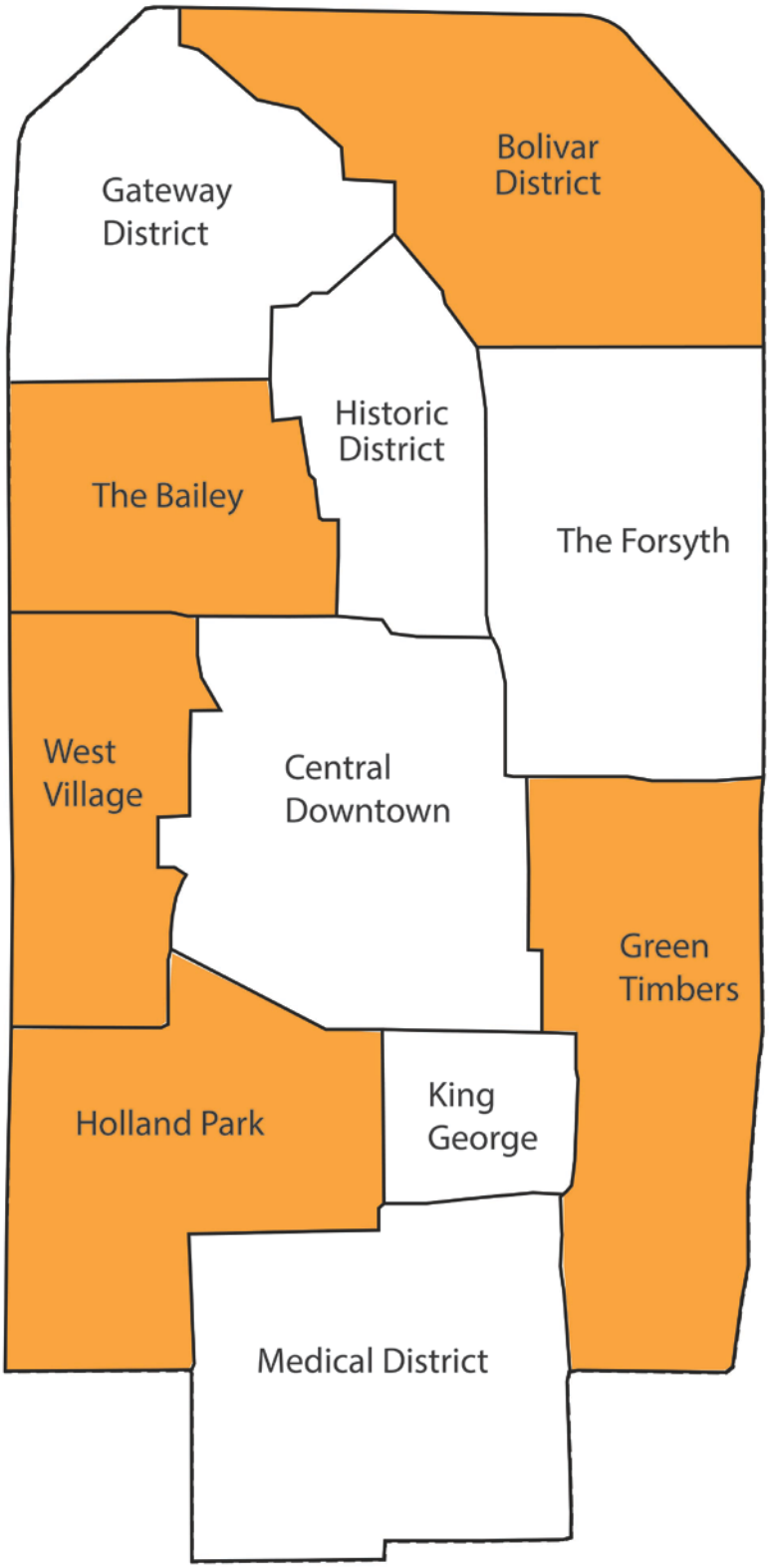
Potential Future Scenario Showing 3-D View of the Medical District Looking West

3.3

RESIDENTIAL NEIGHBOURHOODS

Five Residential Neighbourhoods have been identified in the City Centre Plan.

RESIDENTIAL NEIGHBOURHOODS
Bolivar
The Bailey
West Village
Green Timbers
Holland Park



Map 6: Residential Neighbourhoods

Bolivar Heights

Adjacent to the Historic District, Bolivar Heights is an established single family residential neighbourhood. The housing form is predominantly single family, but also includes some low density multiple family areas that provide important rental housing stock. Several small churches are also located in this neighbourhood.

Haddon Bolivar (1892-1976) developed the Bolivar Heights neighbourhood. Haddon moved to North Surrey in 1933 to restart his chick hatchery at Bolivar Road and King George Highway. During 1940s Haddon Bolivar purchased property (known as the Bolivar Mansion- which now operates as a care home) and began of clearing land for residential development in what is now known as Bolivar Heights. When Haddon Bolivar and his wife, Laura Bolivar, moved out of their large home they used the home for Florence Nightingale Hospital. The home was moved just east of its first location and in 1957 the 50-bed hospital was opened.

The radial street pattern and street naming create a unique and historic sense of place in Bolivar. The neighbourhood is characterized by off-grid, diagonal streets which were created from the radial street pattern of the larger Bolivar Neighbourhood that extends to the north of the plan area. This road pattern has creates interesting features such as a small green triangle (Antrim Triangle) that is a small green space on Antrim Road between Hansen Road and 110 Avenue and is a remnant of the historic radial street pattern. Street names in this neighbourhood such as Grosvenor Road, Bentley, Hansen and Hilton Roads reinforce the historic roots of this area.

This area is also characterized by its views. As the third highest point in the City and enjoys spectacular views towards the Fraser River delta, the North Shore and North Cascade mountains, Vancouver Island and the Gulf Islands. These views can be experienced from many areas in the City Centre, but the Bolivar Neighbourhood in particular offers open views to the north.

Vision

With open views to the river and mountains to the north, this neighbourhood will be a hidden single-family gem near the higher density core of the downtown. The vision for this neighbourhood is to preserve strong single family residential built form and character, while providing opportunities for gentle infill. Bolivar Heights will be centered around a new neighbourhood park, Grosvenor Park, that will reflect the existing single family residential character of the area

This unique single family neighborhood is in close proximity to the higher density office, shopping, transit and other amenities, but still offers a small single family character that can appeal to families. Smaller neighbourhood corner stores, coffee shops and other small-scale retail uses designed for local residents within the single family area will add charm and diversity.

Pockets of larger lots within the neighbourhood, and properties along Grosvenor Road, 112 Avenue, as well as other major roads will see redevelopment into denser single family housing forms. These include small lots, coach houses, manor homes (quad-plexes), and duplexes.

Walkability will be a key factor in the single family area. As gentle infill occurs, a street-grid that provides a high degree of connectivity will be created. New streets created through subdivision blend into the existing neighbourhood because they will be named rather than numbered, in order to integrate with the existing street names that provide a historic character in this neighbourhood.

Key Sites or Components

1. Grosvenor Park
2. Antrim Triangle
3. Grosvenor Pathway
4. Historic Bolivar Mansion/Florence Nightingale Hospital (now care facility)
5. Galbraith Heritage House

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**2,500**	**3,000**	**4,000**
Employment	**30**	**50**	**100**

Bolivar Neighbourhood

3.2

Urban Design & Public Realm Features

Gentle Infill

To maintain the single family character of this neighbourhood, a gentle infill approach will be used when considering redevelopment. Small lot, infill densities may be supported along 96 Avenue, portions of 134 Street and 112 Avenue. The properties facing onto the future Grosvenor Park will be considered for small lots, with provision of new roads and lanes. Buildings should face directly onto the park to provide natural surveillance of the park site.

Redevelopment to small lot single family residential zones may include RF-10 and RF-12, RF-SD, and CD zones to allow manor houses. A finer-grained street grid network must be provided for this building form.

Neighbourhood Retail and Service Uses

Small-scale neighbourhood retail and service uses such as coffee shops, hair stylist, florists, or health practitioners may be permitted in the residential neighbourhood. These may be provided in the form of RF-9S Special Residential Zone type development that permits a maximum of 30 percent of the floor area for non-residential uses as part of a live-work development.

Bolivar Mansion- Heritage Interpretation Opportunity

The Bolivar Mansion: The building has been significantly altered, however there is potential for interpretation related to the Bolivar Family and the Florence Nightingale Hospital.

Street Naming

Where possible, new streets created through subdivision that are parallel to the radial street pattern will be "named" rather than numbered, to preserve the historical street naming convention that exists in this neighbourhood.

Galbraith House- Heritage Revitalization

The Galbraith House, located at 13756 112 Avenue was built in 1933 and features vernacular farmhouse architecture and a clipped side gable roof. The modest building was constructed on a large parcel that could support agriculture and poultry farming, integral to families looking to save money during the Great Depression. The house is registered on Surrey's Heritage Inventory, and will be restored and revitalized though a Heritage Revitalization Agreement. The surrounding parcel will be subdivided into smaller single family lots.

Photo of Galbraith House

Potential Future Scenario Showing 3-D View of Bolivar Neighbourhood Looking South-West

The Bailey

The centre of this community is formed by major athletic parks that include baseball diamonds, football practice facility, a recreation centre and a covered outdoor skate park. This central athletic precinct, however, is surrounded by low intensity, under-utilized and vacant lots that are disconnected from the core.

Both Tom Binnie Park and Whalley Athletic Park form the heart of this neighbourhood. Whalley Athletic Park is a major destination for baseball. The history of Whalley Little League is important to the community and attracts users and spectators city-wide. Haddon Bolivar cleared the field for the Whalley Athletic Park and helped provide the fences and bleachers. Along with Gord Wilson and Tom Binnie, he was instrumental in beginning the Whalley Athletic Association. They formed the original men's ball team, the Whalley Chiefs.

Tom Binnie Park was revitalized with the construction of the Chuck Bailey Recreation Centre and a covered skate park. A 30,000 square foot recreation centre was built as a 2010 Olympic Legacy project, and now provides programming geared to youth and seniors which now draws more people and generates more activity to this neighbourhood. Outside, the Surrey Urban Screen, an off-site programming venue for the Surrey Art Gallery, projects digital and interactive art onto the western exterior wall of the community centre.

Adjacent to the recreation centre, is a large covered outdoor skate park and hockey and basketball areas. The skate park, built in 2011, is Canada's first purpose-built covered outdoor recreational skate plaza and bowl complex. The BC Lions football practice facility is located to the south of the covered skate bowl.

To the west and south of the parks are multi-family and single family lots, as well as large tracts of vacant land that creates gaps between the residential areas and the recreation centre and athletic park. The eastern Tom Binnie Park-interface includes single-storey auto and storage use buildings that are gated behind chain-link fences that provide a poor pedestrian interface along City Parkway. The skytrain guideway and BC Parkway Greenway run through the centre of this neighbourhood, creating a barrier between the two park areas.

Vision

The culture of "sport" will be a key driving element in this neighbourhood's character, featuring a large athletic complex formed by major athletic parks that include baseball diamonds, football practice facility, a recreation centre and a covered outdoor skate park at its centre. The park area will be surrounded by higher density residential buildings that face onto the park.

This athletic precinct will become the true heart of this community. With its strong history of Whalley Little League, the Whalley Athletic Park will continue to be a major destination for baseball. The park will also include a commons area with seating, landscaping and pathways that will appeal to a diverse and wide group of users, and provide additional amenity to the residents in the high density developments that surround the parks.

Tom Binnie Park, which contains the Chuck Bailey Recreation Centre, Seniors Centre, Skate Park (the "Chuck") and Urban Screen, will attract a wide variety of users ranging from youth, families and seniors. The Urban Screen, that projects public art onto the western wall of the recreation centre, will provide this neighbourhood with a unique, illuminated public art feature.

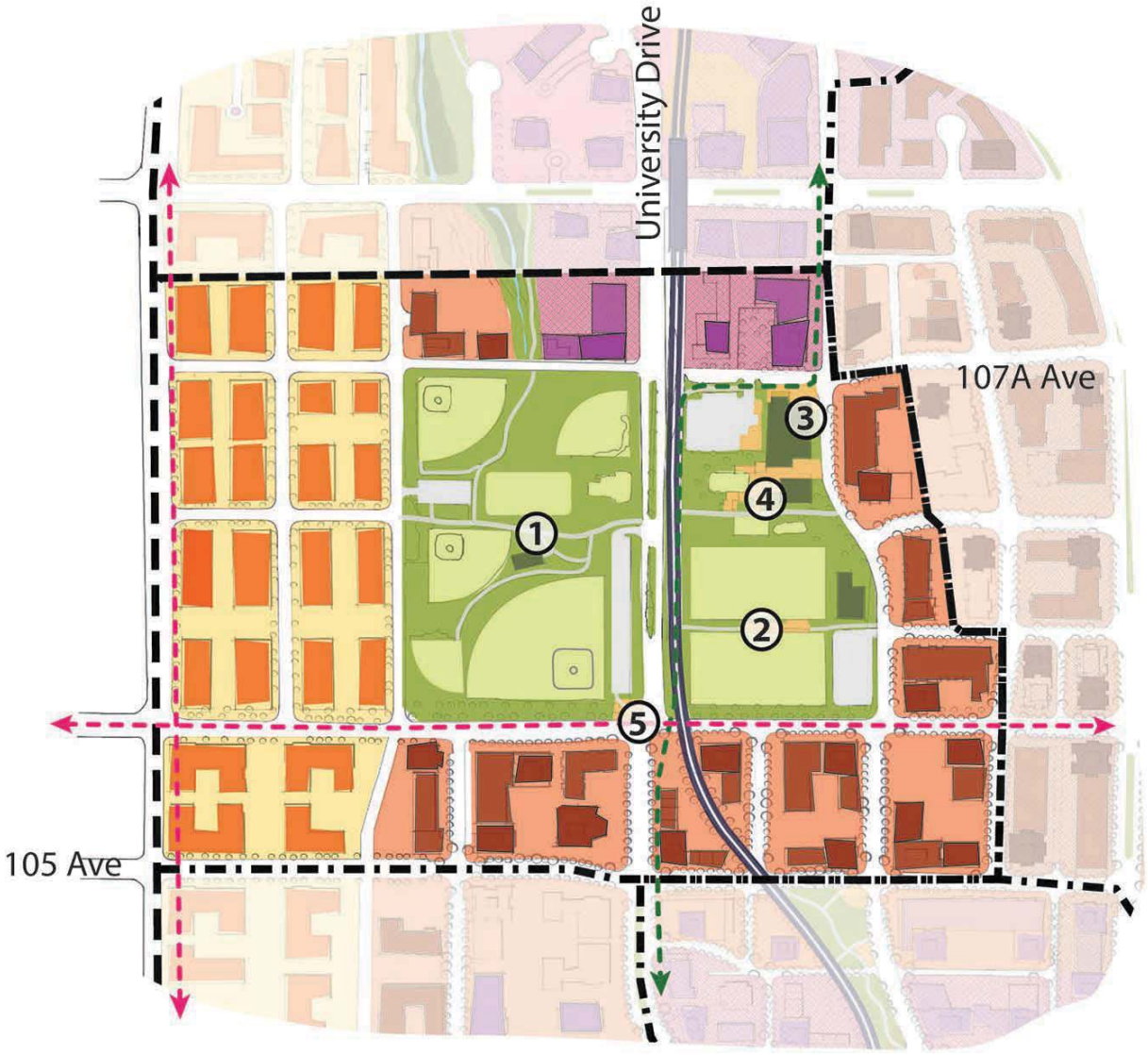
Segregated cycle tracks have been provided on 105A-Avenue which runs along the southern edge of the park. The BC Parkway Greenway will provide a separated multi-use path through the centre of this neighbourhood along University Drive. The greenway connection will provide an all ages and abilities walking and cycling experience from the Gateway district in the north to the recreational centre at the core of this neighbourhood.

Key Sites or Components

1. Whalley Athletic Park
2. Tom Binnie Park
3. Chuck Bailey Recreation Centre
4. Covered Outdoor Skate Park
5. Segregated Cycle Track Pilot Project

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**1,500**	**5,500**	**10,000**
Employment	**175**	**200**	**250**



The Bailey

- Density - 5.5 FAR
- Density - 3.5 FAR
- Density - 2.5 FAR
- Creek
- Multi-use Pathway
- Separated Cycle Track
- Park
- Park - Sport/Active
- Plaza

The Bailey Neighbourhood

3.2

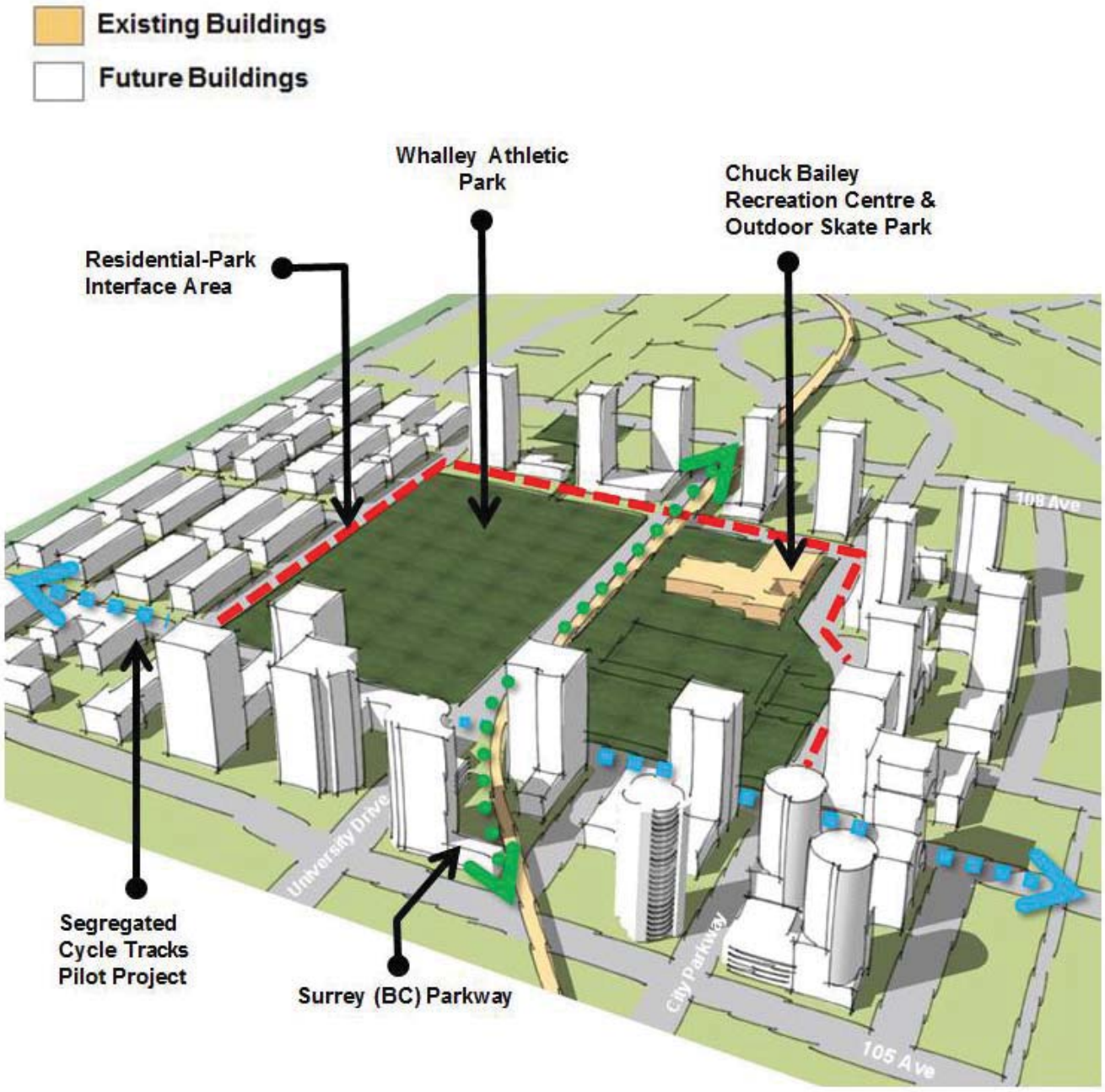
Urban Design & Public Realm Features

Residential & Park Interface

Residential redevelopment surrounding the athletic fields and recreation centre will introduce active edge conditions along the perimeters of park and athletic fields. High-rise residential buildings with include a strong pedestrian scale townhouse podium. The park-facing residential units provide natural surveillance of the park. Landscaping on private property will create a clear delineation between private and public realm

105A Cycle Tracks

The City has taken the first steps towards creating an all ages and abilities cycling network with the pilot of cycle tracks on 105A Ave. This project explored the opportunities to retrofit an existing street; going forward cycle tracks will largely be delivered through new road standards triggered by redevelopment.



Potential Future Scenario Showing 3-D View of the Bailey Neighbourhood Looking North

West Village

The West Village neighbourhood is a rapidly transitioning into a growing urban residential area comprised of a mix of 4-storey apartments, new high rise residential towers and tracts of single family homes. This area has been the focus of recent development activity partly because to its close proximity to civic, retail and transit services.

With this development, the neighbourhood is seeing a high quality public realm, landscaping, and pedestrian pathways. This changing form of new urban residential development will ultimately support the civic and university uses to the east.

A new district energy centre within a small urban park is being constructed in this neighbourhood. High density residential developments in this neighbourhood will be connected to this energy system for heating. The plant is designed to be an educational as well as function asset for this community.

Vision

This neighbourhood is envisioned as a high density, green urban village connected with fine-grained pedestrian walkways, green lanes, plazas and open space areas. A high quality pedestrian realm will be a key design feature of this urban neighbourhood. High rise tower developments will have townhouse or four-storey podiums to provide a pedestrian-friendly interface. Residential units will face onto the sidewalk, with natural landscaping layers to delineate the public and private realm.

Located to the west of the Central Downtown District, this residential neighbourhood will support the adjacent civic, retail and educational uses. Central Avenue (formally 103 A Avenue) will form a key east west connection into the Civic Core. Neighbourhood scale commercial will be located along Central Avenue.

Surrey's first District Energy Centre will be located in this neighbourhood. This building, co-located with a neighbourhood park will identify this neighbourhood as a truly green, sustainable urban village. The site will be an amenity for local neighbourhood residents, and also draw visitors to view the inner workings of this showcase facility. Open facades on the district energy plant will allow viewing of the internal functions from the outside.

Key Sites and Components

1. District Energy Centre & Public Art
2. West Village Park
3. Public Art on Corner Plaza of Wave Tower site

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**6,000**	**11,000**	**14,000**
Employment	**40**	**50**	**300**

West Village Neighbourhood

3.2

Urban Design & Redevelopment

Pedestrian Friendly Interface

Townhouse podium forms will provide a pedestrian friendly interface for the high-density towers. These podium units will provide natural surveillance of the streets with setbacks of 4.5 metres and entrances that face the street. High quality landscaping, low fencing, stoops and porch areas will provide a clear delineation between the private and public realm.

Conceptual Sketch of Residential Interface

Single Family Interface

The western boundary of this neighbourhood is situated across from single family housing forms. In order to provide a suitable transition to the single family, the western side of the neighbourhood will redevelop into apartment and townhouse forms.

West Village Park

West Village Park will be a future mini-neighbourhood park that will provide contemporary urban space and a plaza. It will also include passive space and a children's playground.

West Village District Energy Centre

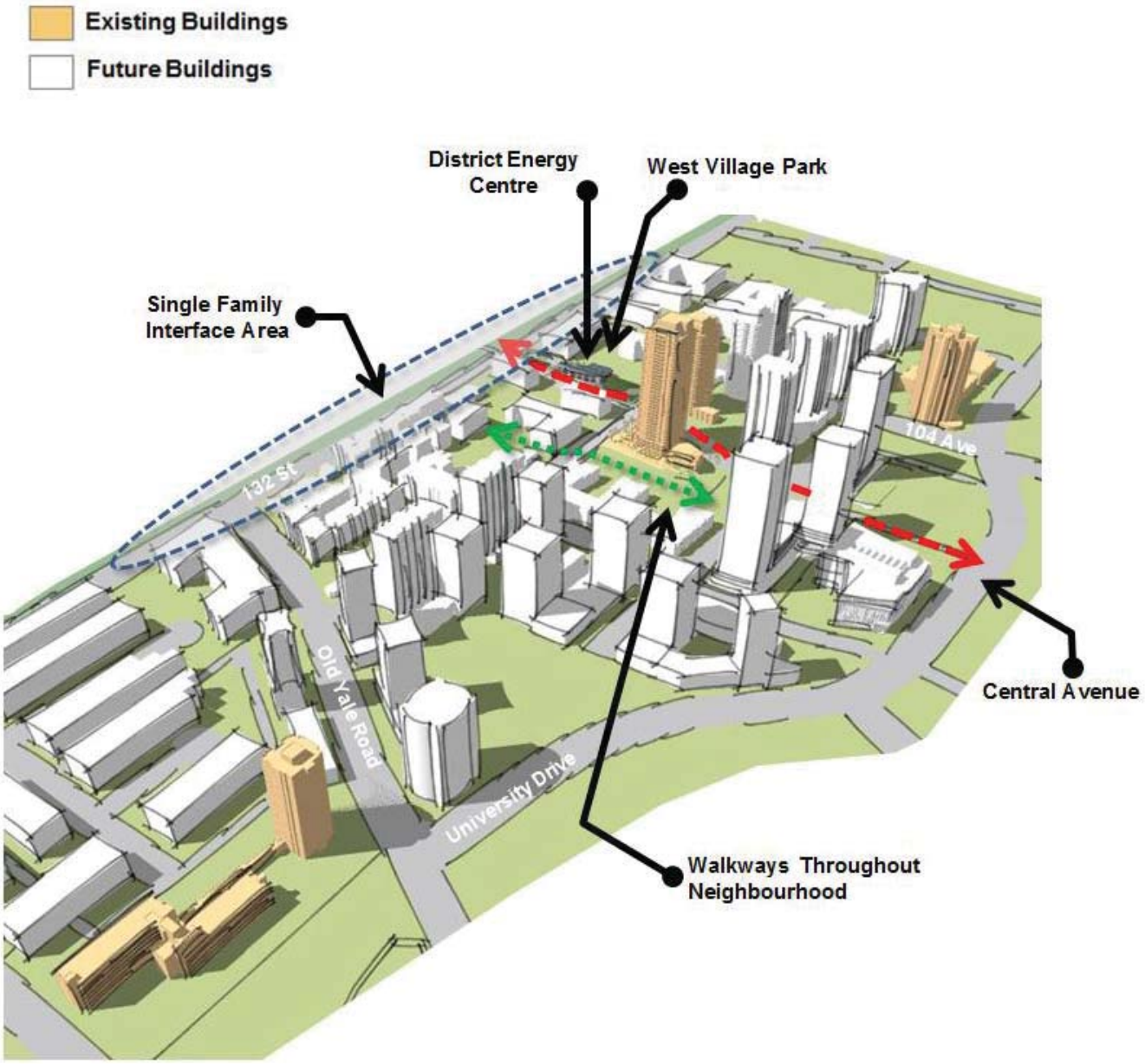
A district energy centre will be located within West Village Neighbourhood Park. The City-owned district energy system will produce hot water at the district energy plant and then distribute this hot water through a dedicated pipe system to heat the buildings in the West Village Neighbourhood.

Corner Plazas and Walkways

Publically accessible open space and walkways will permeate this neighbourhood. Corner plazas should be designed with each development to provide additional outdoor amenity space. These plaza areas should include amenities such as seating, art installations, specialty paving and other unique features. The plazas will be connected through public connected pathways and green lanes that provide pedestrians with multiple routing options that promote walkability.

Central Avenue (103 Avenue)

Central Avenue will be a key east-west street in this neighbourhood, connecting residents to the civic core and Transit Parkway to the east. Small scale active neighbourhood commercial will be permitted at the ground floor.



Potential Future Scenario Showing 3-D View of West Village Neighbourhood Looking North-West

3.2

Green Timbers

Located to the west of Green Timbers Forest/Nature Reserve, this residential neighbourhood is largely characterized by established four-storey apartment and townhouse areas with single-family pockets.

The north-eastern side of the neighbourhood is mainly comprised of the older apartment sites, developed on large sites providing very little pedestrian penetrability. However, longer term road connections have been identified on the plan, to allow for better connectivity in the future.

The western and southern areas of the neighbourhood contain largely single family housing forms and newer apartment sites. Redevelopment of these areas of West Green Timbers will create a finer grained road and pathway network to improve walkability.

A powerline utility corridor runs north-south through the central spine of this neighbourhood, making the corridor an ideal connecting feature to knit the community together. Improvements along the powerline greenway have started on the segment between 102 Avenue and Fraser Highway. These include installation of community gardens, bike paths, and natural area plantings and ecosystem restoration projects that provide important wildlife habitat.

Vision

The Green Timbers neighbourhood is envisioned as a medium density residential neighbourhood, connected with a large north-south green corridor lined with pedestrian-oriented amenities. The neighbourhood's close proximity to Green Timbers Urban Forest also contributes to the area's green identity through its connection to large natural areas.

The powerline greenway is the largest identifying feature of this neighbourhood. Public art and amenities will enhance the powerline greenway and its features will vary from north to south. Natural drainage features connect the corridor into the headwaters of Quibble Creek.

The Powerline corridor intersects with the Central City, Bon Accord and Fraser Greenways to offer additional multi-use pathway connections to Green Timbers Urban Forest and Nature Park, RCMP E Division Headquarters, Jim Pattison Outpatient Facility and to King George Skytrain Station and Light Rail Transit.

Four to six storey apartments will be the dominant housing form in this neighbourhood ideally located near major employment areas to the eastern side of the neighbourhood. New residential developments will integrate with the existing apartments, and provide improved neighbourhood walking connections through provision of pathways that run through private development sites.

Key Sites and Components

1. Future Neighbourhood Park
2. Quibble Creek Greenway and Powerline Corridor
3. Rising Sun Innovation Centre
4. Green Timber Forest Reserve
5. Jim Pattison Outpatient Facility
6. Future LRT Station on Fraser Hwy Line

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**5,800**	**7,000**	**9,000**
Employment	**110**	**170**	**200**

Green Timbers Neighbourhood

3.2

Urban Design & Public Realm Features

Walkway Connections

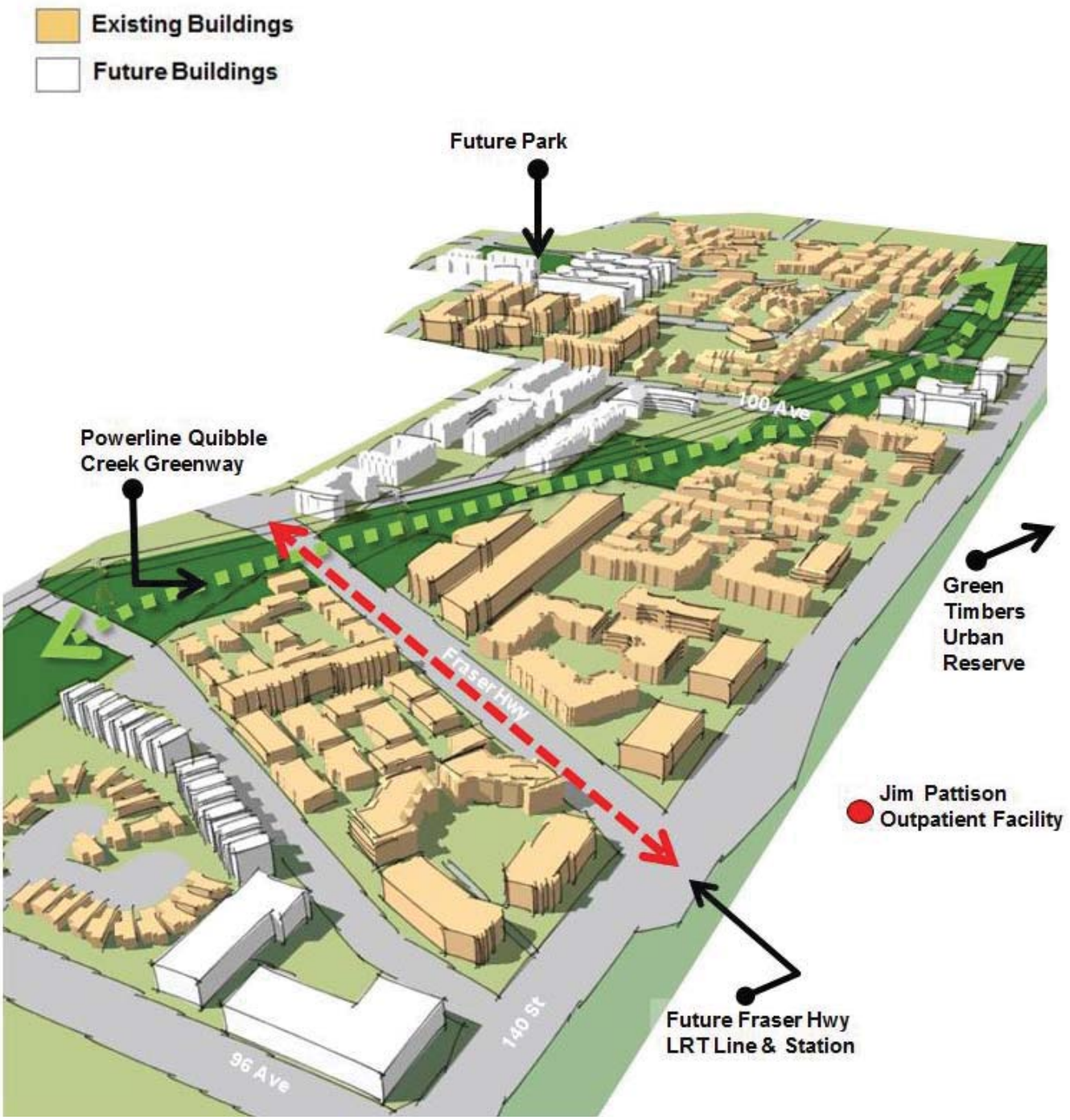
Since the established apartment sites in the northeast area of the plan will not develop in the near future, achieving ideal " walkability block size will be a challenge. To create a walkable neighbourhood in this area, provision of additional green lanes and pathways will be required with redevelopment sites.

Special consideration should be given to provide improved connections east-west between the powerline and Green Timbers (adjacent to large urban forest- nature park), as well as King George Boulevard.

LRT Station

The Fraser Highway LRT line runs through the southern section of this neighbourhood at 140 Street and Fraser Highway.

Sketch of Green Timbers Neighbourhood along Powerline Greenway



Potential Future Scenario Showing 3-D View of Green Timbers Neighbourhood Looking North-West

3.2

Holland Park

This area is an established single family neighbourhood to the southwest of Holland Park. The single family area has been developed in a cul-de-sac street pattern, with narrow pedestrian walkways that connect cul-de-sacs and run along the side yards of single family homes. This pattern provides little surveillance along the pathways, however, does provide some north-south pedestrian connectivity to the school.

Holland Park is the largest feature of the neighbourhood, drawing thousands of people for city-wide events, as well as providing local amenities for the surrounding local residents.

At over 10 hectares, the urban park is the Central Park of Surrey's evolving City Centre. The Park has played host to a number of large scale festivals and celebrations, including the Surrey Live Site at the 2010 Winter Olympic Games and Fusion Festival, Canada's largest annual multi-cultural celebration. The park is also host to music concerts, as well as community celebrations and gatherings.

Vision

Located by Surrey's largest urban park, the Holland Park neighbourhood will be a highly desirable family-oriented neighbourhood adjacent to park amenities, as well as near King George and Central Downtown Districts. It is envisioned to remain largely as a single family neighbourhood, with a small area of medium density apartments.

Holland Park will provide residents with daily amenities such as walking loops, playgrounds, volleyball courts, gardens, seating areas and fountains. It will also attract people city-wide for its major events, festivals, and music concerts.

The residential area to the south of Holland Park will see increased density as single family homes redevelop into mid-rise apartments, while the character of the single family area to the south west of the park will be preserved through gentle infill development.

Key Sites and Components

1. Holland Park & Public Art Installations Throughout
2. Future Residential Density Intensification
3. Single Family Gentle infill Area
4. Queen Meadows Park
5. Queen Elizabeth High School

Projections

	Existing	2043 Forecast	Build Out Potential
Population	**1,600**	**2,000**	**4,800**
Employment	**32**	**40**	**60**

Urban Design & Public Realm Features

Gentle Infill Residential Area

The western part of the neighbourhood will retain its single family character, while gentle infill development in key areas will add incremental density to the single family area. Specifically, density increase will be permitted along 96 Avenue, 100 Avenue, 134 Street and 132 Street, to allow for arterial street widening. Redevelopment to small lot single family residential zones may include RF-10 and RF-12, RF-SD, and CD zones to allow manor houses.

Medium Density Residential Area

The area south of Holland Park will see more change with redevelopment of single family homes into mid-rise apartments. Through redevelopment, new walkway connections will be provided to improve north-south connections to Holland Park and AHP Mathews School. A key east-west connection will be established along 98B-Avenue, connecting the neighbourhood to the skytrain station, LRT, retail and entertainment uses to the east and hospital to the south.

Residential-Park Interface

The single family lots along the southern edge of Holland Park will be consolidated into the park site. This will improve the residential-park interface, changing it from the current backyard facing condition into an open street edge along the southern part of the park.

Holland Park Neighbourhood

3.2

PART B

Framework

SECTION 4
Land Use and Density

4
LAND USE AND DENSITY

The City Centre Plan provides for a wide range of densities and land uses aimed at transforming the suburban landscape into one that is more urban.

The following section describes the land use and density requirements to help achieve the City Centre vision for a transit-oriented downtown. Each land use designation will have different design and development criteria depending on the location and interface. The basic requirements applicable to the land use are discussed in this section. Additional criteria related to design and policy is outlined in the "Districts and Neighbourhoods" and "Urban Design Guidelines" sections of the document.

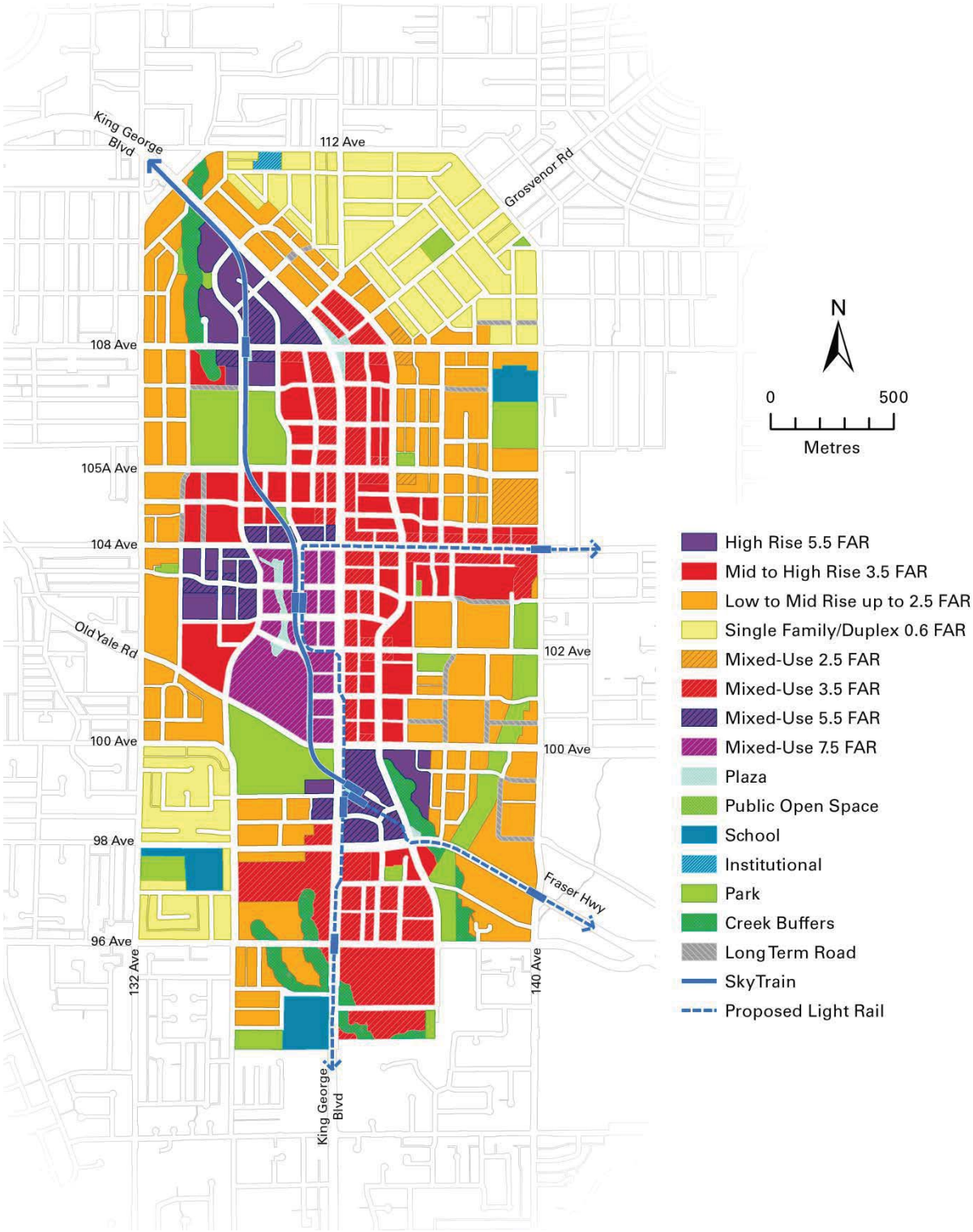
4.1 OVERVIEW

Higher densities and mixed uses, supported by a walkable environment, will create the framework for an urban and vibrant downtown.

Land Uses and Density

The City Centre Plan proposes a wide range of densities and uses to support the creation of a vital and robust downtown. To support walking and transit usage, the highest residential and employment densities are proposed within 400 metres of each skytrain station node and the lowest densities are located away from the core. Land uses and densities are shown on **Map 7** City Centre Land Use Plan.

This section will describe the Mixed Use and Residential Areas proposed in the plan.



Map 7: City Centre Land Use Plan

4.1

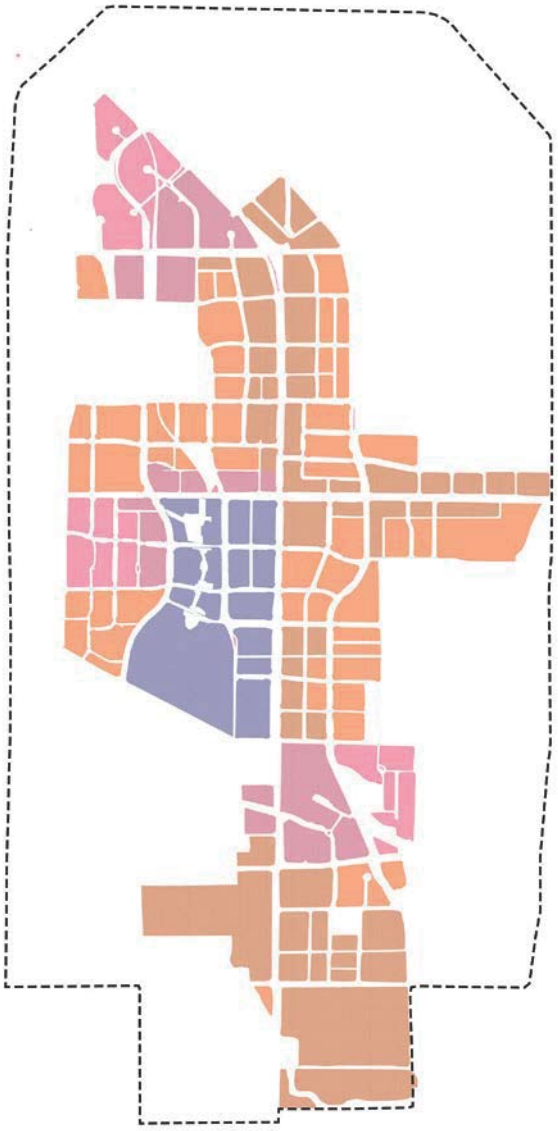
4.2
MIXED USE

The City Centre Plan proposes mixed use areas that allow for a combination of residential, commercial, civic, institutional, and recreational uses.

Mixed land use areas tend to be vibrant, more livable and thrive economically. They provide urban amenities and opportunities for living, shopping, entertainment, and employment all in close proximity. These areas also result in higher levels of walking, cycling and transit use.

The City Centre Plan proposes mixed use designations along frequent transit corridors and transit station areas. Major civic, office and institutional mixed uses (including City Hall, Library and University) are currently located within the Surrey Central Skytrain Station node. Two secondary office employment nodes are located at Gateway Station at the north, and at the Surrey Memorial Hospital area at the south end of the plan. Commercial mixed use corridors are proposed along King George Boulevard and 104 Avenue.

Activation of the streetscape is an integral part of successful mixed use areas. .A set of ground floor interface requirements has been established for developing in mixed use designations of the plan. Refer to Section 11.4 of the plan for a description of the requirements. .



Land use Plan- Mixed Use Areas

Mixed Use High Density (7.5 & 5.5 FAR)

The highest mixed-use densities are planned near the three Skytrain Station nodes providing a mix of residential, employment and retail uses in a highly walkable environment that is transit-oriented. Surrey Central forms the highest density and largest mixed use node in the plan. A secondary high density mixed-use area surrounds the King George Skytrain Station at the south end of the plan, and a smaller third, high density mixed-use node is located at the north end around the Gateway Skytrain Station.

The transformation at these nodes will take place in the form of comprehensive developments comprised of numerous buildings that may be either multi-use developments with stand-alone office, institutional or residential on the same site; or they may be mixed-use developments with a combination of office, institutional and residential uses in one building. Uses on the ground floor of buildings will vary depending on the location, but will largely require active ground floor uses. Requirements for specific ground floor uses are outlined in Section 11 Development Polices.

Mixed Use Medium Density (3.5 FAR)

Medium scale mixed-use densities are planned along King George Boulevard, 104 Avenue, and in the southern area of the plan, the Innovation District. The 104 Avenue and King George corridors are envisioned as key retail corridors with small scale retail along the northern portion of King George Boulevard, and transit corridor-based retail along 104 Avenue. The area around the Surrey Memorial Hospital, emerging as the "Medical District," will be mainly made up of medical and related technology office uses that support the hospital.

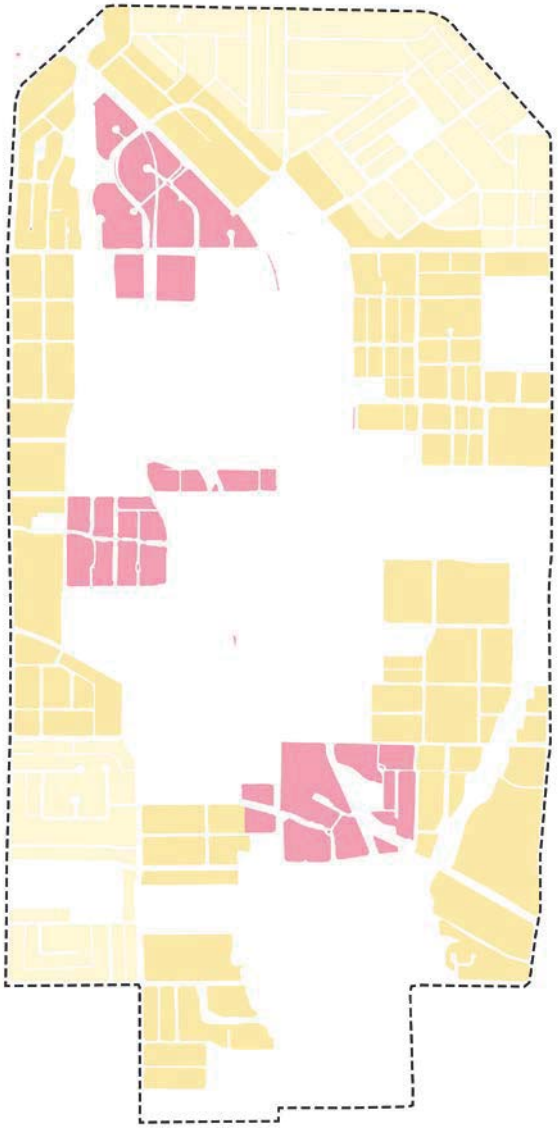
Mixed Use Low Density (2.5 FAR)

A few 2.5 FAR mixed use areas are located near the perimeter of the plan area. These designations are intended to allow existing institutional uses to densify and add uses that complement existing developments on the site.

4.3 RESIDENTIAL

A full range of housing types and densities are proposed in the plan.

The plan proposes a full range of residential forms and densities. High rise and mid-rise buildings between 3.5 to 5.5 floor area ratio (FAR) will support the employment and commercial areas as well as increased transit usage. Apartment buildings and townhouse with an FAR up to 2.5 will provide housing for families as well as transition to smaller building forms. Two single family areas will be preserved to further provide opportunities for families to locate close to the downtown.



Land Use Plan- Residential Areas

High Rise (5.5 FAR)

High rise towers will be located within walking distance to the SkyTrain stations. This designation allows a gross density of 5.5 FAR in the form of a high rise apartment building.

- Developments should provide a 2 or 3 storey townhouse base at podium of a high rise building
- Developments should provide publically accessible outdoor amenity space such as mini plazas as part of the amenity space requirement of zoning by-law (see Design Guidelines for design details)
- Developments should consider providing a proportion of rental housing as part of development
- Small scale active neighbourhood commercial may be permitted at the ground floor along major streets.

Mid-Rise (3.5 FAR)

Mid-rise towers will serve as a transitional area between higher densities and lower densities. The site may have a mix of building forms including mid-rise and high rise, with an overall gross site density of 3.5 FAR.

- For sites within a 10 minute walking distance of skytrain or major public university, consider providing a proportion of rental housing as part of development
- A limited amount of neighbourhood serving commercial will be permitted at ground level.
- Consider providing publically accessible outdoor amenity space as part of the amenity space requirements of the by-law.

Low Rise Apartment and Townhouse (up to 2.5 FAR)

Located along the perimeter of the plan, this designation will provide a transition between the proposed mid-rise areas and single family along outer boundary of the plan. The designation allows for gross density up to 2.5 FAR in the form of medium to low density townhouses and 4-6 Storey apartments.

- A limited amount of neighbourhood serving commercial will be permitted at ground level (see appropriate section in Districts & Neighbourhoods for more detail).
- Small, publically accessible corner plazas may be incorporated into site design (see Design Guidelines for details).

Single Family/Duplex

Two areas are proposed to largely remain single family neighbourhoods to allow families living close to the downtown and to provide diversity of housing choice. These areas are located at northeast corner of plan- extension of Bolivar Heights Neighbourhood, and south west of Holland Park.

- In order to provide needed road widening and gentle infill, lots along arterial roads, and some large single family sites will be permitted to increase the site density. Small lot, infill densities may be supported along 96 Avenue, portions of 134 Street and 112 Avenue. (see Districts & Neighbourhoods & Development Policies Sections).
- Redevelopment in these infill areas to Small Lot Single Family Residential zones may include RF-10 and RF-12, RF-SD, and CD zones to allow manor houses. A finer-grained street grid network must be provided for this building form.
- Live-Work will be considered in Single-Family areas.
- Density may be increased to preserve heritage buildings as identified in City Centre Heritage Review
- To promote walkability and vibrancy, small scale neighbourhood serving commercial sites will be allowed within the single family neighbourhoods.

4.5 PROJECTED BUILD OUT

Population & Employment

Population Projections

It is projected that by 2034 the population in City Centre will reach approximately 50,000 and 65,000 by 2044. Although the current land use plan update is planned for a thirty-year time horizon, the population in the plan area will not reach full capacity during this timeframe. Using the current land use plan designations, it is estimated that the City Centre population could reach full build-out capacity at 134,000 people within an 80 to 100 year timeframe.

Employment Projections

It is estimated that the number of jobs in City Centre will increase from 23,584 to 38,000 over the next 30 years.

Units & Floor Space

Residential Unit Capacity

City Centre has a total projected build-out capacity of approximately between 50,000 and 70,000 residential dwelling units. The majority of residential development in City Centre will consist of multi-family units. If the average dwelling unit size is assumed at 600 square feet, then the unit capacity is 70,000.

Non- Residential Floor Space

Under the proposed Land Use Plan, it is estimated that there is capacity for a total of 25 million square feet of non-residential space in the City Centre. By 2044 it is anticipated that the non-residential floor space will increase by 50% (4.4 million) totalling 13.4 million square feet.

Rendering of Potential 2040 City Centre Build Out Scenario

Table 1 Projected Units and Population Based on Land Use Plan

Land Use	Acres	Projected Low Units	Projected High Units	Projected Low Population	Projected High Population
Creek Buffers	36	0	0	0	0
Existing and Future Roads	447	0	0	0	0
Park	102	0	0	0	0
Creek Buffers	36	0	0	0	0
Plaza	5	0	0	0	0
Mixed-Use (2.5 FAR)	11	300	390	691	946
Mixed-Use (3.5 FAR)	126	8,998	13,197	16,723	24,302
Mixed-Use (5.5 FAR)	38	5,106	6,278	9,318	11,428
Mixed-Use (7.5 FAR)	46	1,344	1,841	2,447	3,342
Residential High Rise (5.5 FAR)	40	7,550	9,033	14,004	16,697
Residential Low to Mid Rise (up to 2.5 FAR)	272	16,620	22,899	32,245	44,051
Residential Mid to High Rise (3.5 FAR)	97	11,404	16,437	20,771	29,862
Single Family	147	1,033	1,033	3,288	3,288
Institutional	2	115	115	141	141
School	24	0	0	0	0
Total	**1,429**	**52,470**	**71,223**	**99,628**	**134,056**

SECTION 5
Transportation

5
TRANSPORTATION

New high quality transit and active transportation facilities for all ages and abilities support City Centre's transformation into a vibrant urban centre.

This section outlines the Transportation framework for the City Centre Plan. It includes seven themes as follows: Street Network, Street Typology, Walking, Transit and Ridesharing, Cycling, Vehicle Circulation, Parking Supply and Management.

5.1 OVERVIEW

The transportation strategy in City Centre emphasizes active transportation and transit, supported by a fine grained road network with a robust hierarchy of arterial and collector roads, lanes, and local streets, and supplemented by greenways and off-street paths.

This approach includes creating a road network to improve connectivity and small block sizes and multi-modal street design to accommodate many modes of mobility for all ages and abilities. Combined, these aspects improve safety and functionally for all users and support the economic and social vitality key to a successful downtown.

With the growth of the City Centre and its concentration of people and activities, transportation safety considerations are at the forefront of the planning, design and monitoring processes. The emphasis on increasing walking and cycling is an explicit focus in the development of the Safe Mobility Plan.

Speed is at the core of a safe road system. The design speed of roads is largely determined by lane widths and the number of intersections. A finer-grained road network and more consistent vehicle speed will help drive down injuries. In addition to improving safety, lower speeds increase the capacity of the road network, as slower moving vehicles require less space between them. The City Centre road network incorporates these best practices.

The Transportation section in the City Centre Plan is organized into seven themes:

- **Street Network**
- **Street Typology**
- **Walking**
- **Transit and Ridesharing**
- **Cycling**
- **Vehicle Circulation**
- **Parking Supply and Management**

Image Showing Future LRT along King George Blvd

5.2
STREET NETWORK

A finer grained road network will transform the City Centre into a walkable, pedestrian-oriented downtown.

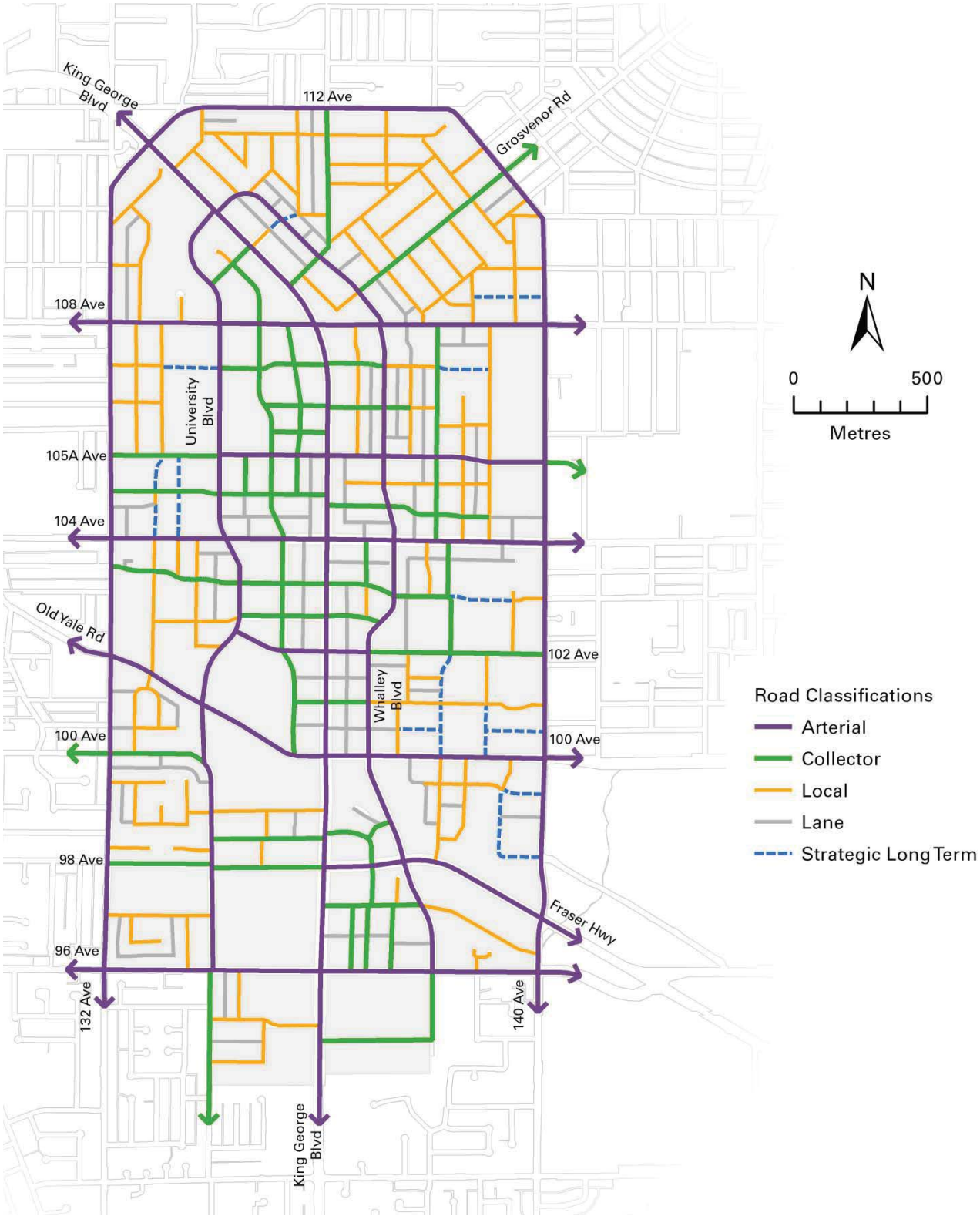
The street grid is the skeleton that supports the growth of a city and defines the form of development. Each street serves multiple roles: connecting places and people, providing public realm improvements, and supporting economic activity.

The City Centre's street network dates back to Surrey's agricultural beginnings based on a one-mile (1,600m) grid of arterials. Many connector roads within City Centre are short and discontinuous, creating very large blocks that service large-format highway-style retail and commercial developments fronted by street-facing parking lots.

The absence of a fully completed network and alternatives for through traffic from other parts of the City and other municipalities creates additional congestion within City Centre and a less safe and pleasant environment for pedestrians and cyclists.

The vision for City Centre's street network is for a finer-grained, connected framework that facilitates mobility and enhances the safety for all citizens, creating a vibrant, pedestrian-oriented downtown.

There are two key interventions to deliver the street network vision in City Centre: creating a finer grid for better connections within City Centre and completing strategic missing links to better connect with the rest of the City.



Map 8 City Centre Road Classifications

5.2

Framework for Change

The finer grained road network will produce a grid of intersections every 80 to 100 metres to support walking and cycling as the most convenient ways to get around City Centre. This will create ideal block spacing without detracting from project viability.

This road network will be delivered primarily through redevelopment with the dedication of new local roads, green lanes, and some collectors assisting this role. Development will be responsible for the dedication of land and full construction of the finer grained network including engineering servicing and utilities, and constructing or contributing to new traffic signals, where warranted.

New roads will be delivered through dedication rather than ROW/easements because dedication provides security of access in perpetually, and guarantees consistent maintenance standards. The City has developed tools to reduce the impact of the finer grid on development and ensure equity:

- **Gross Density Calculation -**The floor area ratio (FAR) will be calculated on a gross site area, before dedications for roadways or other public purposes are accounted for, as outlined in the City's Official Community Plan.

- **Flexible Road Design-**There will be some flexibility with regard to design and alignment of local roads and lanes within comprehensive re-developments as long as they meet the original intent of the finer grained road network and do not adversely impact other parcels.

Policy in Practice: West Village

An example of this finer-grained road network is illustrated below in the West Village Master Plan. Originally one very large super block, the approved Road Network Concept indicates an initial division of the block bounded by 104 Ave, 133 St, 102A Ave, and 133A Ave into three blocks as the basis for creating new road connections.

At the time of development, 8 parcels were created with the provision of additional local roads, lanes, and pedestrian only connections to achieve the ideal 80-100m block sizes.

This approach identified the basic road framework as shown in the Road Network Concept, and the finer-grained block sizes were established with additional local roads, green lanes and public pathways at time of redevelopment.

The overall intent is to achieve a block size between 80 to 100 metres. Since parcel size and consolidation can be difficult to predict, this approach allows a cases-by-case analysis of unique conditions associated with each proposal to produce ideal block sizes and overall connectivity.

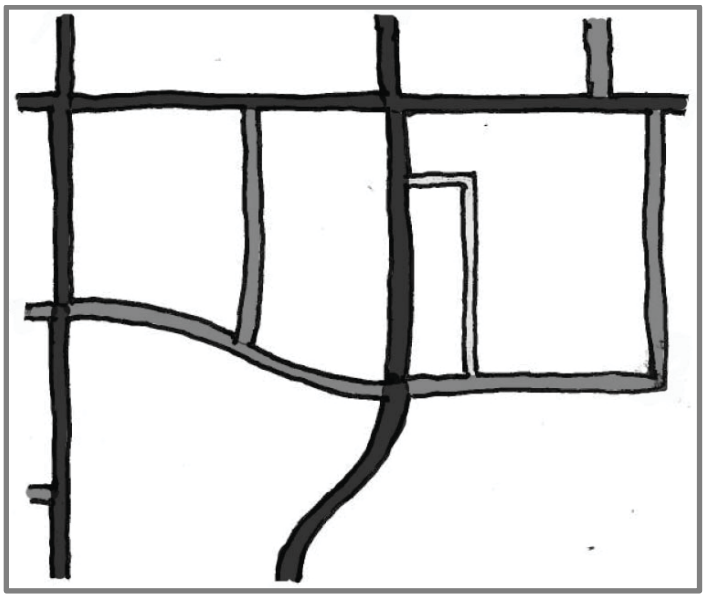


Diagram Illustrates Basic Road Network

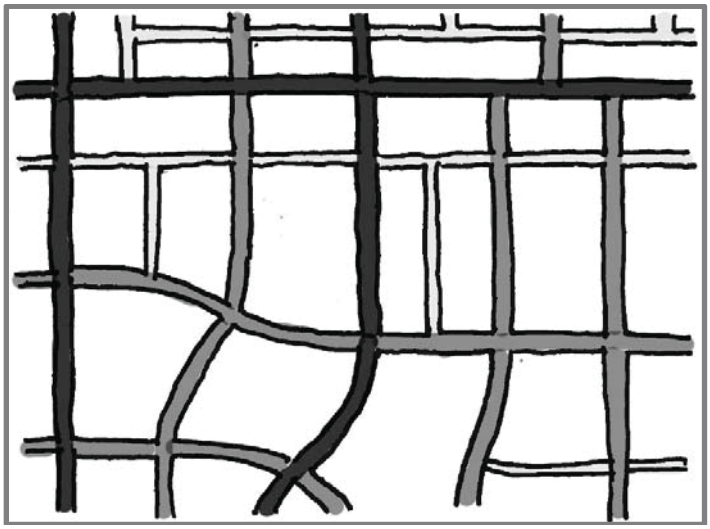


Diagram Illustrates Finer-Grain Road Network

Strategic Road Connections

The City Centre Road Network Concept identifies missing portions of the arterial road network that are required to distribute traffic and increase resiliency. Arterials are the backbone of the road network and serve to move large volumes of people and goods over longer distances and can be important transit corridors. The full Road Network identifies:

- completion of the inner ring roads including University Boulevard and Whalley Boulevard.
- completion of the outer ring road which includes 132 St, 140 St and 112 Ave.
- extension of existing collector roads
- addition of new collector roads, local roads, and green lanes.

The City's Engineering 10 Year Servicing Plan recognizes the need for network improvements in City Centre. Roads and traffic signals identified in the 10 Year Servicing Plan within City Centre area shown in **Table 2** below:

These 10 Year Plan projects, including property acquisition, are funded by City-wide DCCs as shown in Section 12. Transportation Financing describes in detail the planned transportation infrastructure costs and funding. Through regular updates, individual projects and priorities identified in the Ten-Year Servicing Plan sometimes change in response to competing demands on the transportation network, and as projects are built others get added such as the completion of 112 Ave.

Table 2 10 Year Plan Projects Within City Centre

10 Year Plan Projects Within City Centre		
Project	**Location**	**Timing**
Arterial Strategic Missing Links		
Whalley Blvd	96 Ave to Fraser Highway	Short Term
105A Ave	137 St (Whalley Boulevard) to 140 St	Medium Term
Arterial Widening		
Fraser Highway	138 St - 96 Ave	Short Term
100 Ave	King George Blvd to 140 St	Short Term
140 St	100 Ave to 104 Ave	Medium Term
Collector Road Completion		
103 Ave (widening)	City Parkway - King George Blvd	Long Term
City Parkway (widening)	104 Ave to 105 Ave	Medium Term
103 Ave (new)	132 St - 133 St	Short Term
New Traffic Signals		
108 Ave / City Parkway		Short Term
100 Ave / 138 St		Short Term
105A Ave / 140 St		Medium Term
103 Ave / City Parkway		Long Term

There are also projects outside the plan area that benefit City Centre and facilitate its transformation to a downtown for the South of Fraser. As illustrated in **Map 9**, these include the following:

- **South Fraser Perimeter Road**-The Province's recently constructed South Fraser Perimeter Road (Highway 17) has already reduced the impact of the 108 Ave and 104 Ave to King George Boulevard connections for vehicles and in particular trucks not bound for City Centre.

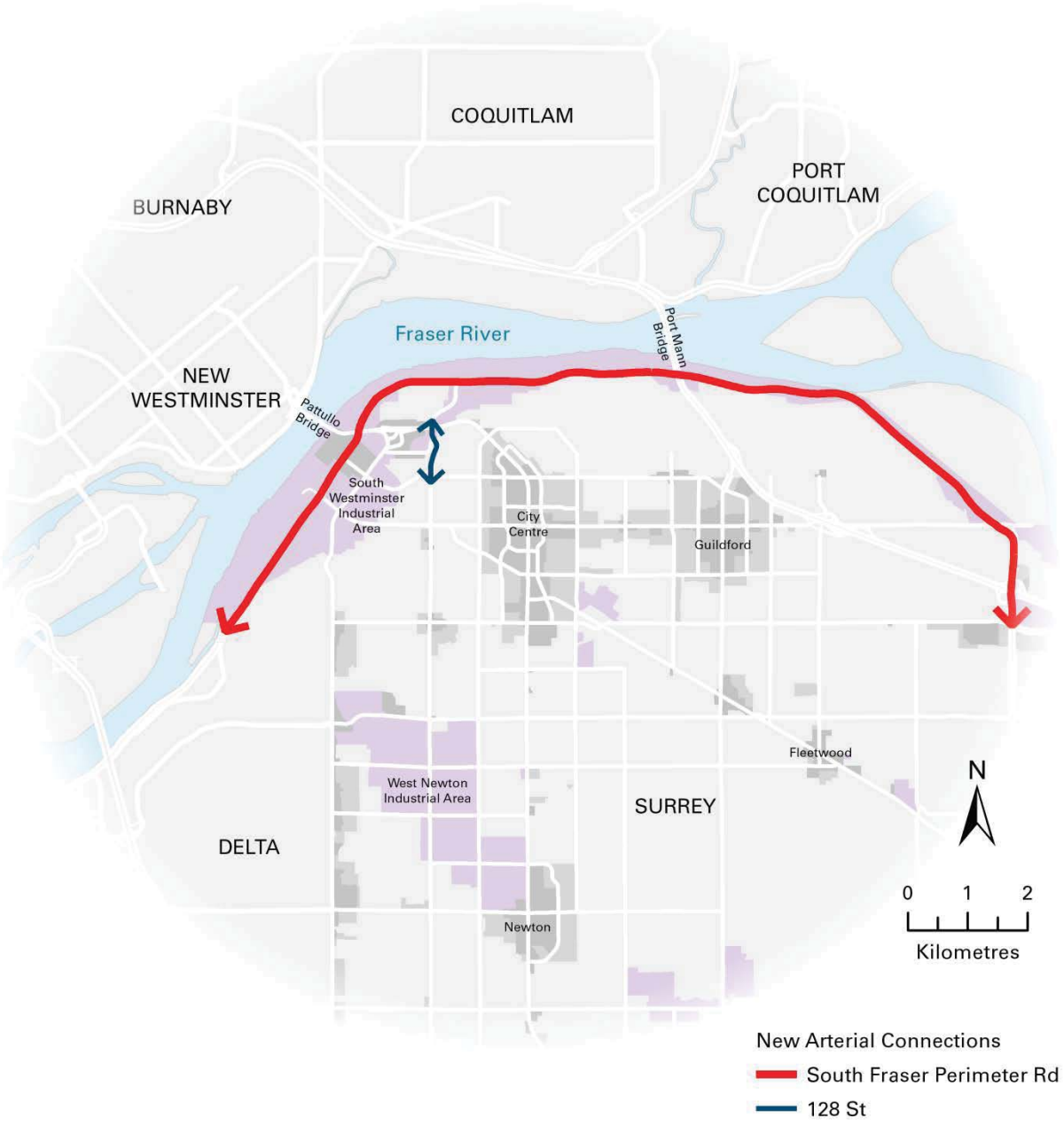
- **New Pattulo Bridge-** TransLink's new Pattullo Bridge is expected to include direct connections to South Fraser Perimeter Road when it opens in 2022, further lessening the need for through traffic in City Centre.

- **Arterial Feeder Routes**- Projects in the City's 10 Year Servicing Plan include the widening of arterial feeder routes and the future extension of 128 St to King George Boulevard. This key link will support more efficient goods movement with a shorted trip between the Newton industrial area and the Pattullo Bridge, bypassing City Centre.

Table 3 shows roads and traffic signals outside City Centre that will support access to City Centre and in the case of 128 St extension, allow some through traffic to bypass City Centre.

Table 3 10 Year Plan Projects Supporting City Centre

10 Year Plan Projects Supporting City Centre		
Project	**Location**	**Timing**
Arterial Strategic Missing Links		
128 St (new)	108 Ave to King George Blvd	Long Term
Arterial Widening		
128 St	104 Ave to 108 St	Long Term
100 Ave	140 St to 148 St	Short Term
Collector Road Completion		
105A/104A Ave (new)	140 St to 144 St	Long Term
104A Ave (widening)	144 St to 148 St	Long Term
	148 to 150 St	Long Term
New Traffic Signals and Roundabouts		
100 Ave / 144 St (roundabout)		Short Term
105A Ave / 142		Long Term
104A Ave / 144 St		Long Term
105 Ave / 148 St		Long Term
106 Ave / 128 St		Long Term
108 Ave / 128 St		Long Term
110 Ave / 128 St		Long Term



Map 9 Strategic Road Connections

Strategic Property Acquisition

There are a number of key properties where full property acquisition is needed to deliver the finer grained road network in City Centre. These are unlikely to be dedicated through a normal rezoning process. A new strategic property acquisition fund is proposed that uses a levy on development in City Centre only. This removes the need for multiple consolidation and benefitting areas to be created. This modest levy equalizes the costs for providing the finer grained road network as it will benefit all development.

Arterial Road Frontages

Within City Centre, arterial road frontage construction is the responsibility of the adjacent development. This is to ensure that streets are finished in conjunction with development, as higher densities will generate immediate walking and cycling trips.

Major Road Network

The Major Road Network (MRN) is a special class of arterials that receive funding from TransLink as they provide important transit corridors and also provide inter-regional connections for the regional network. MRN roads in City Centre include King George Boulevard, Fraser Highway, 96 Ave, and 104 Ave & 108 Ave east of King George Boulevard.

King George Boulevard links City Centre north to New Westminster via the Pattullo Bridge, and south to the Semiahmoo Peninsula and the US Border. Fraser Highway provides a connection east to Langley Centre and 104 Ave and 108 Ave provide important links to Guildford Town Centre.

5.3
STREET TYPOLOGIES

Good street design begins with an understanding that the purpose of each street is not the same – its role in the network should shape its design, how it functions, and how it prioritizes walking, cycling, transit, driving, and goods movement.

The vision for City Centre includes streets that are designed for people of all ages and abilities, allowing them to move round the downtown safely, conveniently, and comfortably, regardless of their mode of transportation.

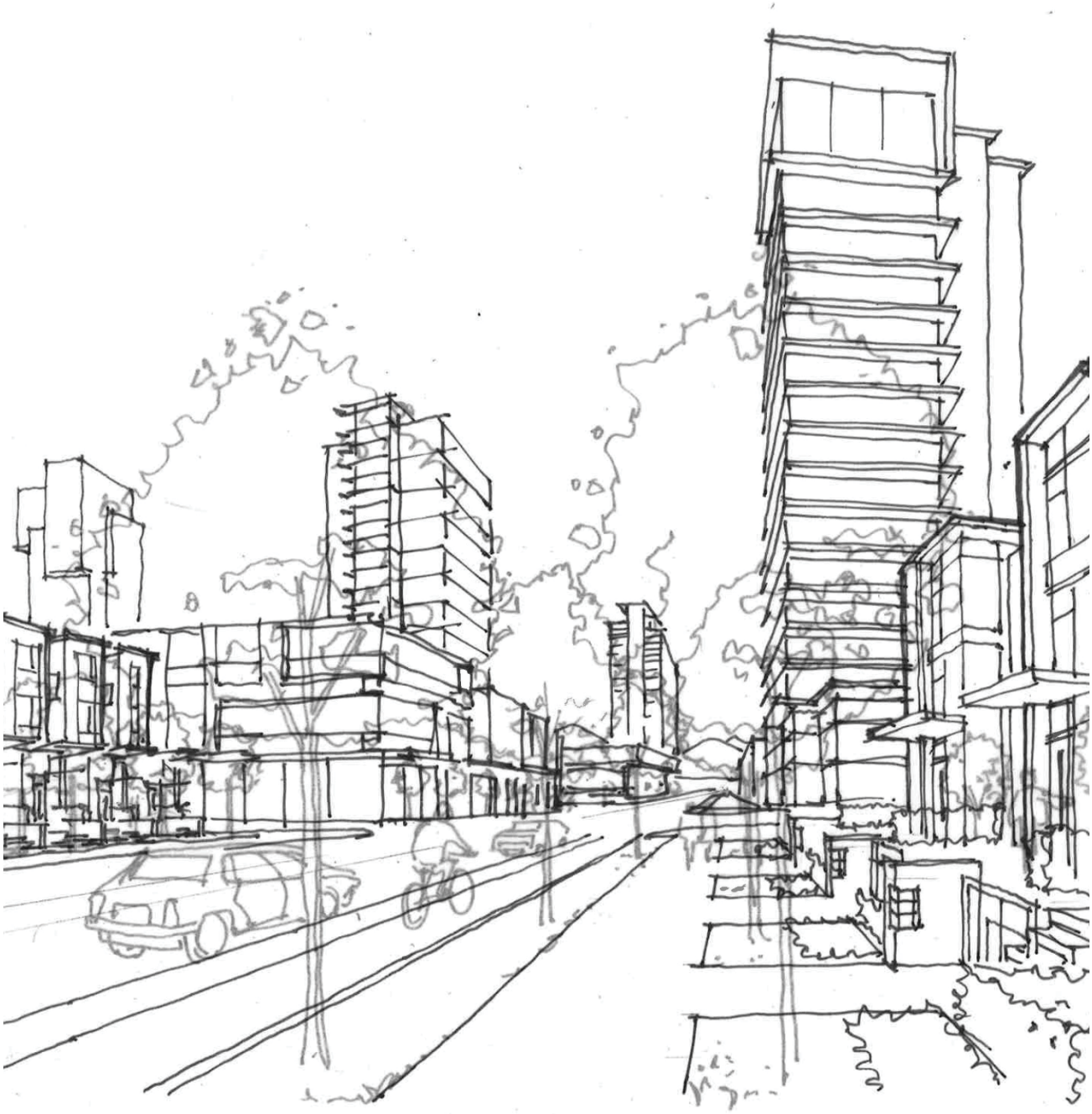
In City Centre today a mixture of older, auto oriented arterials carry high traffic volumes, and limited intersections present challenges to accessibility and connectivity for all modes. Widely spaced collectors provide access to properties and assist distributing traffic from arterial roads. A limited number of existing local roads provide access points to residential buildings and connect to arterial or collector roads, providing some degree of additional network connectivity.

In anticipation of a significant increase in the number of residents and employees, the 1991 City Centre Plan called for a network of inner and outer ring roads, a finer grained street grid, multi-use greenways, and a more pedestrian-friendly local network. A number of projects have been completed in support of the Plan's vision, including targeted investment in the public realm. In particular, the street frontages of new development next to the SkyTrain stations point to a different way forward.

King George Boulevard, another major street in the downtown, has not yet evolved as part of the original vision. This street has been identified to transition from its former role as a provincial highway to a walkable urban boulevard

Focus groups and other public engagement have indicated that improvements to King George Boulevard are the number one priority of the community. In order to make a true transition into a 'Great Street,' a number of elements are missing that would improve the safety and comfort of the street, notably:

- improved sidewalks and boulevards,
- permanent parking, and
- all ages and abilities cycling facilities.



Conceptual Sketch of Typical Arterial Road with Residential Frontage

Framework for Change

A hierarchy of roads is important to serve different road users and ensure safety, while maximizing the benefits provided by road access. This hierarchy is reflected in the City Centre Road Design Standards.

As part of the plan process, a range of new street and intersection designs have been developed giving careful thought to creating a high quality, finer grained, multi-modal, greener, safer, and more differentiated street network in City Centre. **Table 4** shows the different road typologies and associated road widths for each.

Access Management

Access management will also be a key consideration determined by street typology. In general the primary site access will be via local streets and lanes. To increase traffic safety, direct access onto arterials will be limited. To enhance pedestrian comfort direct vehicle access onto arterials and collectors will also be minimized.

Table 4 City Centre Road Widths

City Centre Road Width Table									
Road Type	**Dedication**	**SROW**	**Pavement**	**Parking**	**Sidewalk**	**Boulevard**	**Cycle Track**	**Buffer**	**Streetlights**
Typical Arterial	30.0m	0.5m	16.0m	N/A	2.0m	2.0m	2.1m	0.9m	not staggered
Special Arterial (with Greenway)	32.0m	0.5m	16.0m	N/A	2.0m	2.0m	2.0m	2.0m	not staggered
Collector	24.0m	0.5m	11.0m	both sides	2.0m	2.0m	1.6m	0.9m	not staggered
Local Road	20.0m	0.5m	11.0m	both sides	2.0m	2.5m	N/A	N/A	staggered
Green Lane	12.0m	0.5m	8.0m	one side	1.5m	2.0m	N/A	N/A	staggered
Unique Roads	The following roads will have customized cross sections due to their unique roles in City Centre: King George Boulevard, Fraser Highway, 104 Ave, University Drive, and City Parkway between 102 Ave and 104 Ave								

Arterial Roads

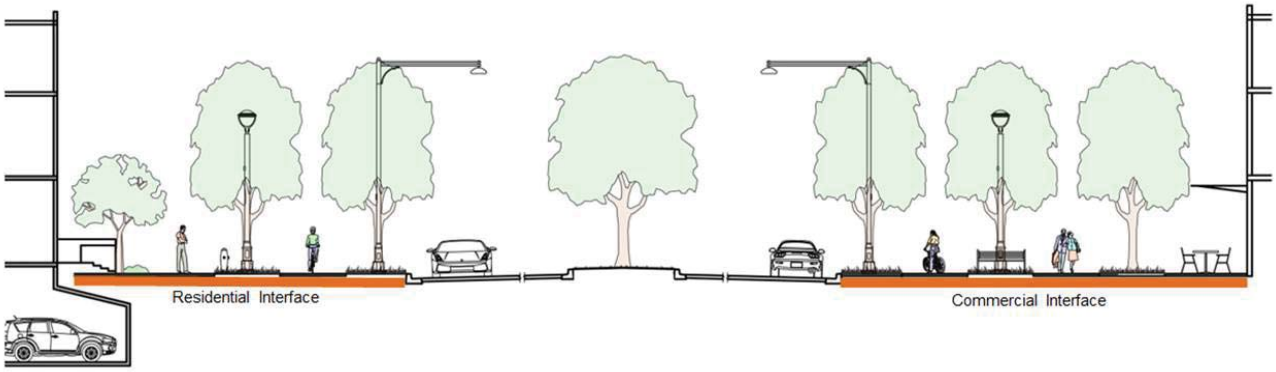
Arterial roads will be upgraded to improve safety and support other transportation modes while continuing to facilitate motor vehicle traffic and goods movement. Wherever possible, special places will be marked with public art and an increased level of urban design.

Arterials with LRT*:* will be redesigned to accommodate the right-of-way requirements for LRT trains as well as general purpose vehicle travel lanes and segregated cycling facilities. This includes King George Boulevard south of 102 Ave, 104 Ave east of City Parkway, and Fraser Highway east of King George Boulevard.

Arterials with Transit: include transit priority measures to support major bus transit routes in addition to the urban forest and active transportation safety improvements noted below.

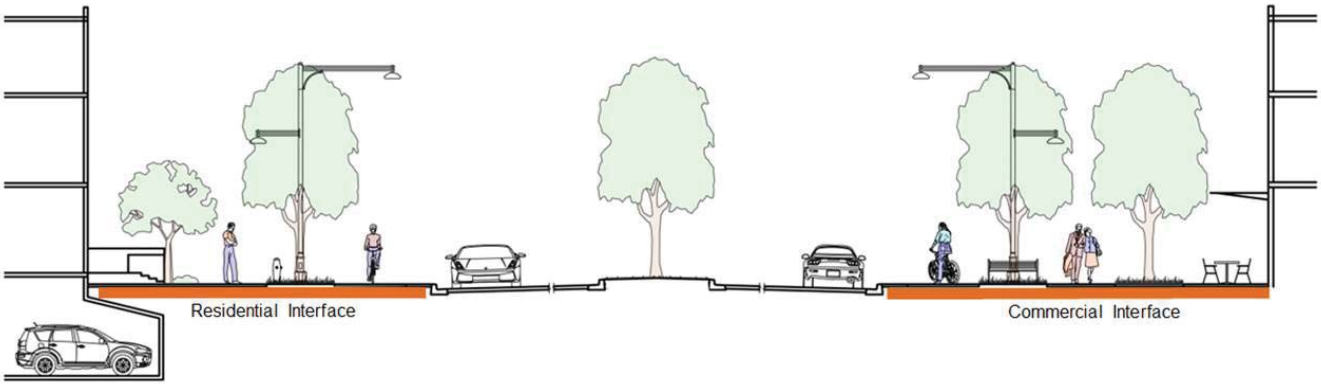
Photos Showing Future Image of Arterial with LRT

Arterials with Greenways: showcase a new design for greenways in an urban context with a double row of street trees lining the one-way cycle tracks. They also have a high-quality pedestrian environment and significant setbacks to enhance the public realm next to development.



Arterial with Greenway Cross Section

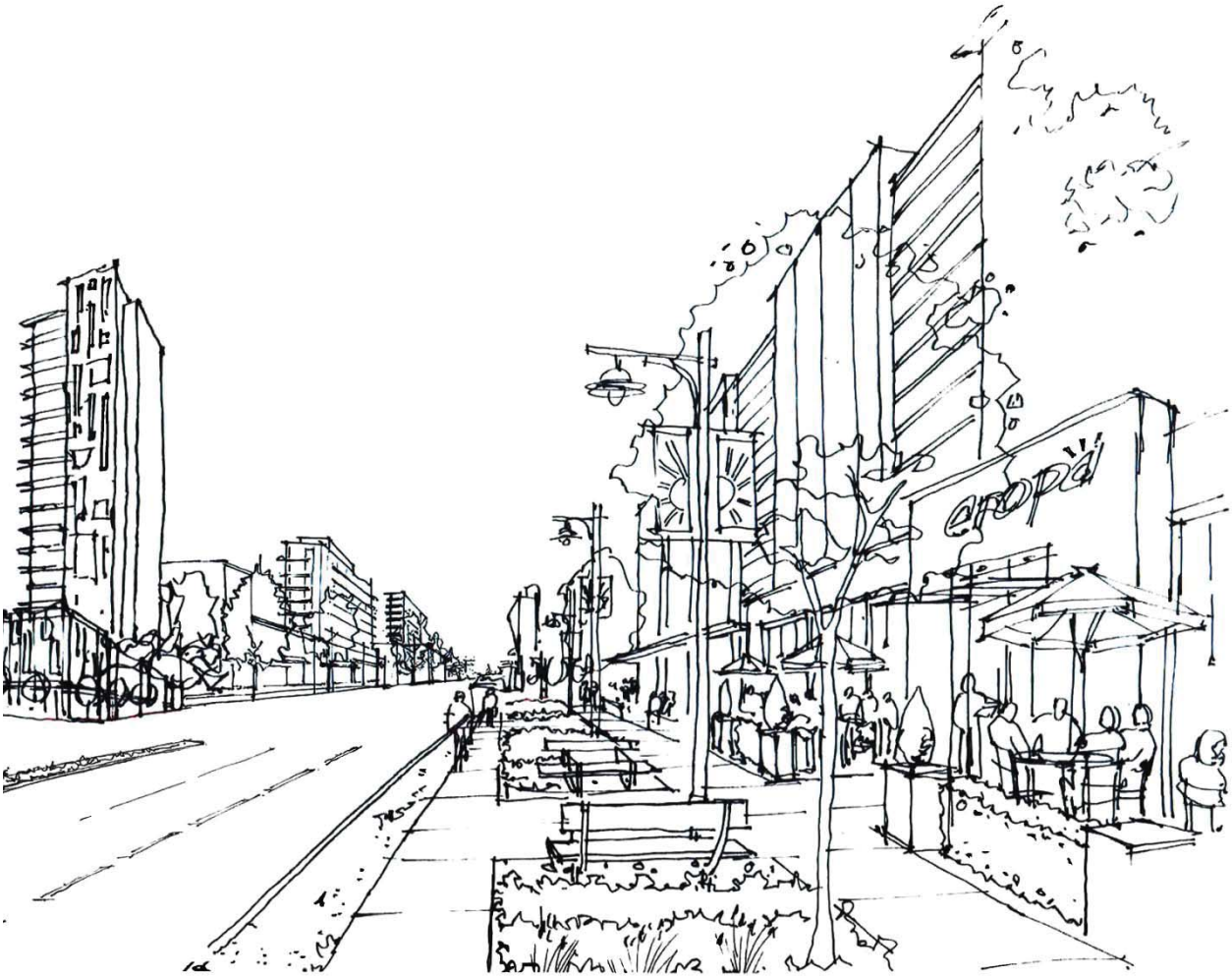
Arterials with Active Transportation: are designed to have a high-quality pedestrian environment, all ages and abilities one-way cycle tracks, and nurture large street trees.



Arterial with Active Transportation Cross Section

King George Boulevard: Will be redesigned in two phases north of 102 Ave in the section without LRT. In the shorter term there is the opportunity to provide wider sidewalks, enhanced boulevard plantings, permanent parking, and segregated cycling facilities without the expense of wholesale changes to the existing curbs, boulevards and median. In the longer term, redevelopment will facilitate the relocation of many of the driveway entrances so they do not cross the sidewalk, and implementation of the new arterial design standards noted above will create a Great Street that accommodates all modes of transportation. South of 102 Ave, King George Boulevard will incorporate LRT in both a side and centre running configuration.

Recognizing its continued role as an important connection to the rest of the City and the Region, the street will continue to carry approximately 35-40,000 motor vehicles a day through City Centre. The intersection of KGB and 108 Ave, known as Whalley's Corner, is the ideal location for a significant public art feature marking it as the gateway to City Centre. A second node identified for a significant public art installation is in the median of King George Boulevard just north of 102 Ave.



Conceptual Sketch of Future King George Boulevard North of 102 Avenue

Collector Roads

Collector roads will improve safety, nurture large street trees, prioritize active transportation and encourage transit where applicable, in a narrower right-of-way than arterials (24-27 metres).

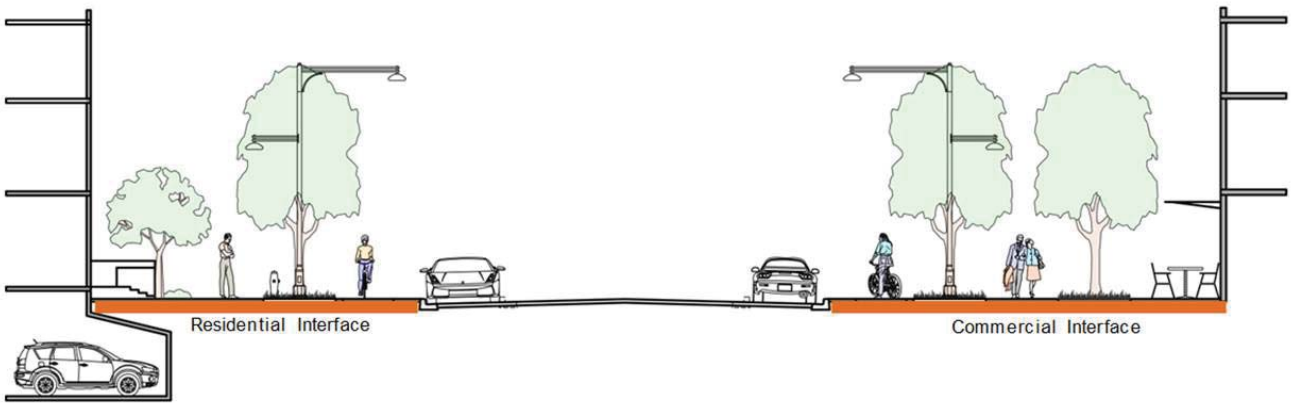
Surrey Central LRT Station on City Parkway: LRT trains from 104 Avenue, King George Boulevard, and Fraser Highway converge at an LRT station located on City Parkway beside the Surrey Central SkyTrain Station. The block of City Parkway between 102A and 103 Avenues will be closed to vehicular traffic to facilitate large pedestrian volumes.

Transit Couplet The reconfiguration of the Surrey Central Exchange from an off-street bus loop to an on-street transit couplet requires the alteration of 102A and 103 Avenues between City Parkway and University Drive to form the on-street facility.

The transit interchange and the Civic Core in general are expected to showcase the City's highest level of urban design including public art features and high quality paving materials that differentiate this area from the rest of City Centre. Additional details are outlined in the Transit Section.

Collectors with Active Transportation, Transit and Parking: will have one-way cycle tracks or two-way multi-use pathways to accommodate cyclists of all ages and abilities. These collectors may also include features that prioritize transit in support of major transit routes. Regulated, on-street parking will be considered in areas where demand for parking is not sufficiently met by off-street parking facilities.

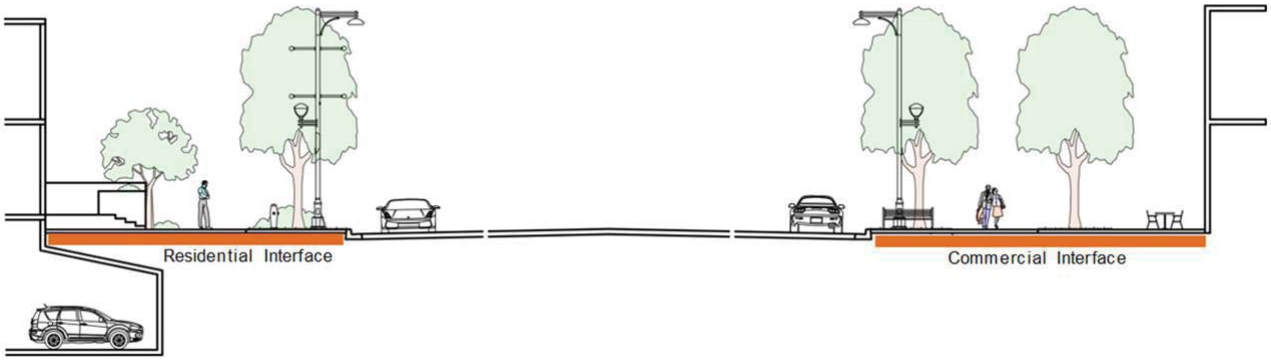
Traditional Collector: in a limited number of areas where there is little opportunity for redevelopment to make substantial changes, traditional collectors will be enhanced through the addition of street trees on both sides of the street and street furniture to create a more pleasant pedestrian environment.



Collector with Active Transportation Cross Section

Local Streets

Local roads will provide vehicle access to residential and high pedestrian-traffic commercial areas. These roads will be 20 metres wide and have lower design speeds to ensure the safety of pedestrians and cyclists.

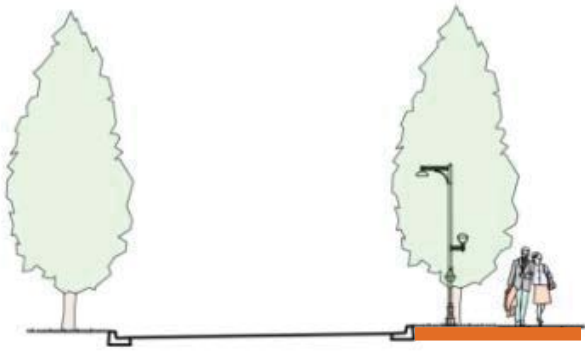


Local Road Cross Section

Green Lanes

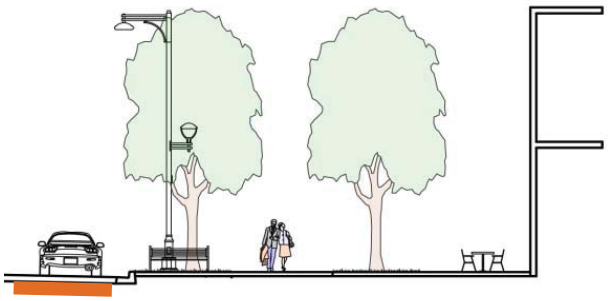
Lanes will continue to serve a primarily functional role, providing vehicle access to underground parking for multiple developments to reduce the number of driveways on adjoining streets, and truck access for deliveries. There is also the opportunity for additional City Centre specific improvements to support pedestrians, on-street parking, and a higher level of design, adding value to the lane network.

Green Lanes: Green Lanes are an upgrade to the existing lane design to facilitate both pedestrian and service connections; they are not meant to replace a local road. Ultimately the long term vision is a greener, more inviting pedestrian and bicycle environment than previous lane standards allowed, with potential opportunities for storm water runoff absorption.



Green Lane Design Provides Pedestrian Safety

Local Roads with Bike Lane Below Curb
Lower traffic speeds will ensure pedestrian and cyclist safety



Roads with Active Transportation
Buffered one-way cycle tracks above the curb create separation from motor vehicle traffic to ensure pedestrian and cyclist safety

Roads with Greenways
A larger buffer above the curb with street trees separate one-way cycle tracks from motorized traffic and a second tree boulevard creates additional separation to ensure pedestrian and cyclist safety

5.4
WALKING

The key to a successful downtown is a creating a safe and inviting walking environment for everyone. Walking creates livelier streets, promotes health and well-being, and fosters economic activity and cohesive communities.

City Centre's pedestrian environment is in transition. In many places City Centre presents a challenging environment for walking with long blocks, large parking lot frontages, and wide streets. As well, pedestrians often encounter high volumes of fast motor vehicle traffic, limited crossing opportunities and long traffic signal timing requiring a button to be pushed to be allowed to proceed.

However, redevelopment in City Centre is delivering new road connections and sidewalks, incrementally improving portions of the downtown core, particularly near the SkyTrain stations and emerging residential neighbourhoods.

The vision for City Centre is to create an environment where walking is the fastest, safest, and most pleasant form of transportation for short local trips.

Conceptual Sketch of City Centre with Safe and Vibrant Walking Environment

Framework for Change

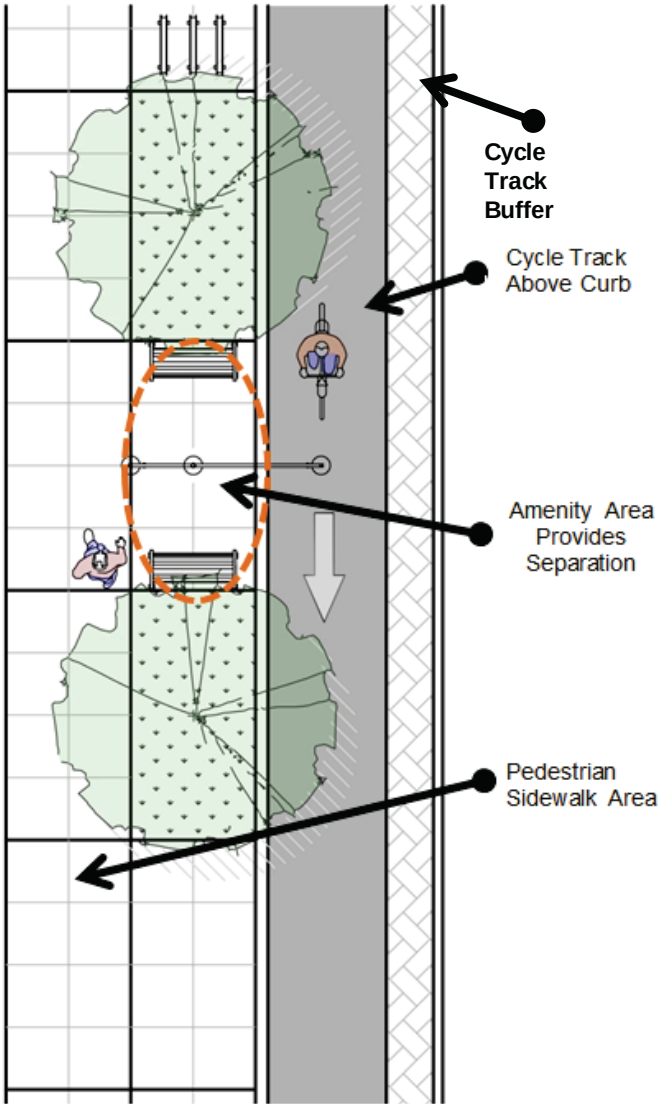
Creating a downtown core where walking is the first choice for all will draw on the key principles identified in the City's Walking Plan: Making Connections, Walking for all, Shaping Surrey, and Streets for People.

The City Centre plan promotes community connections through a finer grained road network, advances a land use plan with densities and a mix of uses that support transit, and introduces urban design principles that support walking. These elements also support the Surrey's Child and Youth Friendly City Strategy, by enabling young people to safely navigate their community on their own.

Key components include:

- **Smaller block sizes** between 80 to 100 metres.
- **A continuous and connected network** of safer complete streets with protected intersections as outlined in previous sections and detailed in the Standard Drawings.
- **Lanes and pedestrian-only connections** through development sites in places where it is not possible to achieve a full road right-of-way but it is desirable to achieve a finer-grained network.
- **Multi-use pathways** to provide comfortable connections for recreational walking trips between parks and green spaces for all ages and abilities.
- **High-quality interface with development** which includes wider sidewalks, slower traffic speeds, enhanced street furniture and lighting, and beautifying the street with trees and plantings.
- **Accessible design features** such as tactile paving, wayfinding, signage, curb let-downs, pedestrian countdown signals and audible traffic signals.

Improvements will be delivered through redevelopment as well as through various City programs. More detail is provided in the Implementation section of the Plan, including Design Guidelines and forthcoming new Standard Drawings. These provide the framework for transforming City Centre into a place where walking is the natural first choice for short trips.



Pedestrian & Cycling Separated by Amenity Zone

5.4

5.5 TRANSIT AND RIDE SHARING

Transit is the key to unlocking City Centre's potential to be the region's next urban centre.

Transit maximizes the mobility and access efficiency of the road network. It allows more goods and people to be moved in the same amount of space; while taxis, car sharing and ride sharing complement the walk or transit trip and provide additional transportation options. In City Centre, transit is comprised of a SkyTrain and bus network with plans for a future Light Rail Transit system. Ride share options are emerging, but limited.

Three Expo Line SkyTrain stations provide excellent connections to the regional rapid transit network north of the Fraser River. However, missing connections include high quality rapid transit connecting City Centre to the other Town Centres south of the Fraser, as well as local services which connect the different neighbourhoods within City Centre.

A suburban style bus loop, in a fenced island configuration, is currently located in the heart of City Centre at the Surrey Central Skytrain Station. Although functional, the configuration isolates activity away from adjacent streets and creates a physical barrier between land uses.

Current Day Surrey Central Exchange Looking West

The bus loop is also currently over capacity with additional bus bays located on City Parkway and University Drive to address the capacity constraints of the existing configuration. Overall, bus transit city-wide in Surrey delivers about 65% of the service hours per capita as the regional average with only 28% of Surrey residents having access to Frequent Transit Network level service (a bus every 15 minutes all day to 9pm) compared to the regional average of 48%. The City's low transit mode share and car dominated City Centre is in part a reflection of this.

There are a limited number of car sharing vehicles located close to Gateway and Surrey Central SkyTrain stations but they are not yet located throughout the emerging residential neighbourhoods. There are also taxi-waiting areas next to the SkyTrain stations. Other ride sharing services have not yet been legalized by the Province of BC.

Access to safe, frequent, high quality transit will be a key element that defines the success of Surrey City Centre. The City Centre Plan envisions high quality public transit as a viable alternative for a majority of South of Fraser residents.

Framework for Change

City Centre will be the largest rapid transit hub south of the Fraser River. A range of transit services will be available to connect City Centre neighbourhoods to each other and all parts of the South of Fraser sub-region. These services will include Light Rail Transit (LRT), additional Frequent Transit Network (FTN) routes – service every 15 minutes all day every day-peak frequent routes, new express services, and local Community Shuttle circulators.

Planning and funding of transit expansion is the responsibility of TransLink but the major activities will be completed in partnership with others, while the City will undertake a number of other actions alone. Enhanced ride sharing services will also be realized through partnership with others.

Conceptual Sketch of Future On-Street Bus Configuration along 103 Avenue (Central Ave)

City Activities

LRT Station Area and Alignment Plans: Mixed use station area and alignment plans will be developed for the 5 LRT stations located within City Centre, with complementary public realm treatments to be delivered with redevelopment.

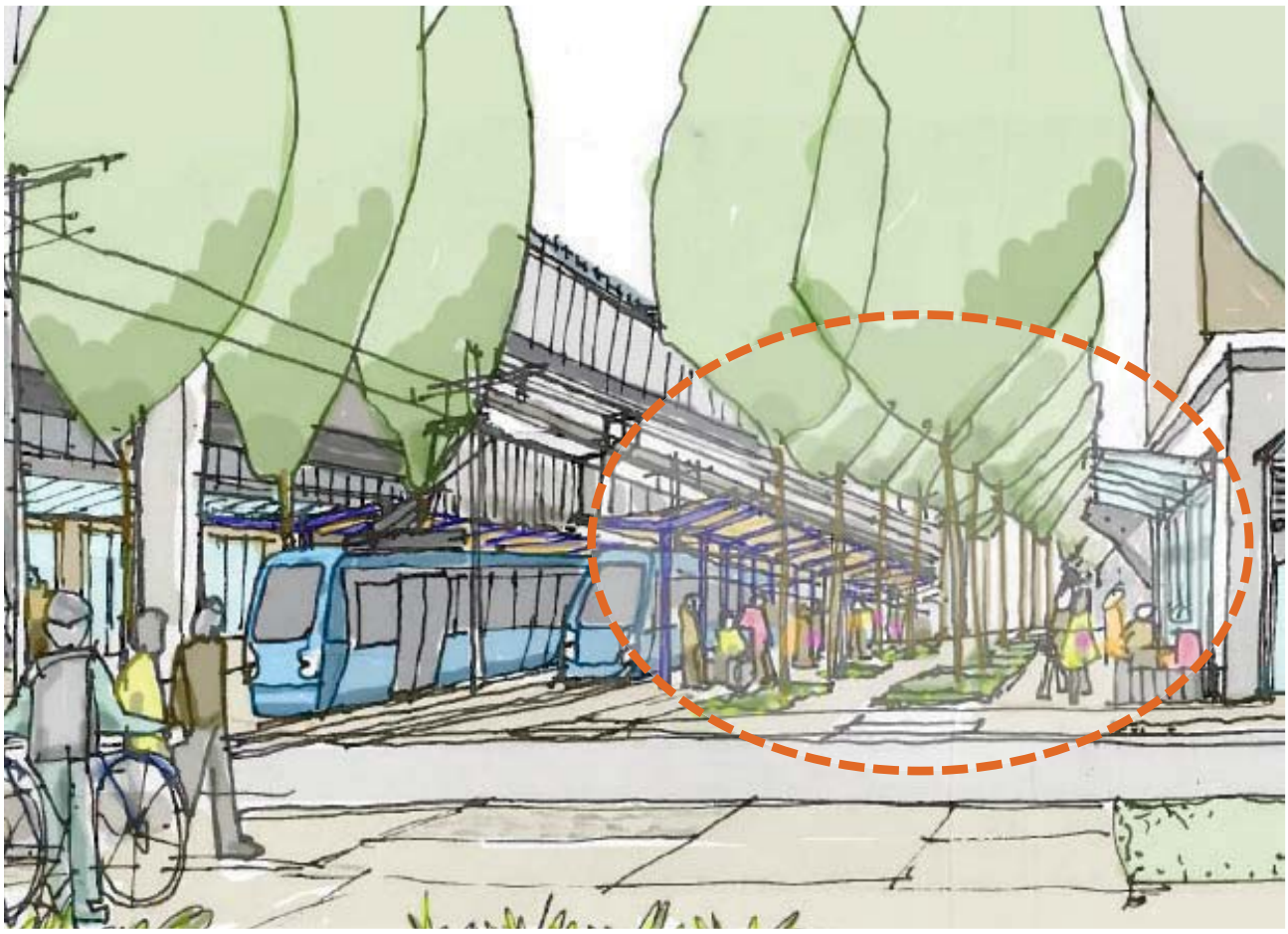
Transit Oriented Design: New LRT stations will be developed in line with TransLink's Transit-Oriented Design principles and the City's Urban Design Guidelines to support residential, commercial, and community-oriented retail spaces.

Urban Design: Urban design requirements will enhance the passenger experience. An important external input will be TransLink's Transit Passenger Facility Design Guidelines. The City's Public Art Plan will guide new infrastructure projects, contributing to Surrey's urbanization, quality of life and economic development.

Pedestrian Connections to Transit: Pedestrian connections between buildings and landscaped elements will be designed to connect to people to transit more efficiently.

Transit Shelters: Transit shelters will continue to be placed at high volume locations that are located near key destinations or user groups. Double shelters will be installed where warranted.

Park and Ride: Private sector underground park and ride opportunities will be explored as part of ongoing redevelopment. Joint parking opportunities such as those that already exist between Central City Mall and SFU Surrey with also be identified.



Rendering Shows Mixed Use and High Quality Urban Design Interface with Transit

Partnership Activities

Mayors' Council Vision: The current document guiding regional transit expansion in Metro Vancouver is the TransLink Mayors' Council Plan. This plan has endorsed LRT as the technology for rapid transit expansion South of the Fraser and a network of B-Lines to extend the reach of rapid transit. The plan also includes a 25% increase in conventional bus service, four times the regional funding for the Major Road Network and ten times the funding for pedestrian and cycling improvements. These investments are key to achieving the transformation of the transportation network in City Centre.

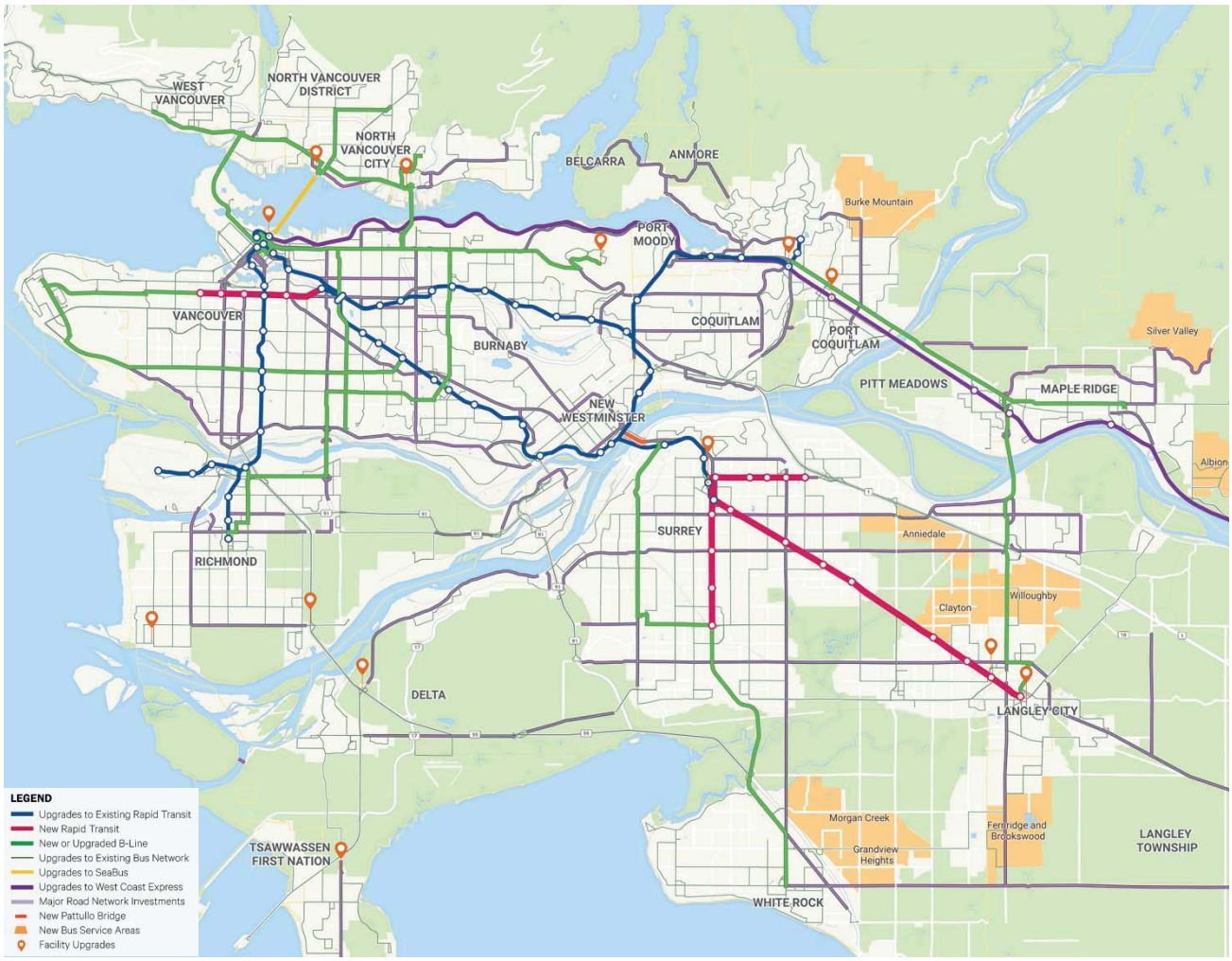
The three existing Expo Line SkyTrain stations will be complemented by five new LRT stations. LRT will provide fast, frequent, and reliable transit service that attracts choice riders and provides the capacity needed to support the concentrated growth in the Regional Growth Strategy.

The LRT corridors will include:

1. **King George Boulevard** connecting to Newton Exchange, with the opportunity for future extensions to South Newton at Highway 10.

2. **104 Avenue** connecting to Guildford Town Centre.

3. **Fraser Highway** linking City Centre to Fleetwood, Clayton, and Langley Centre.

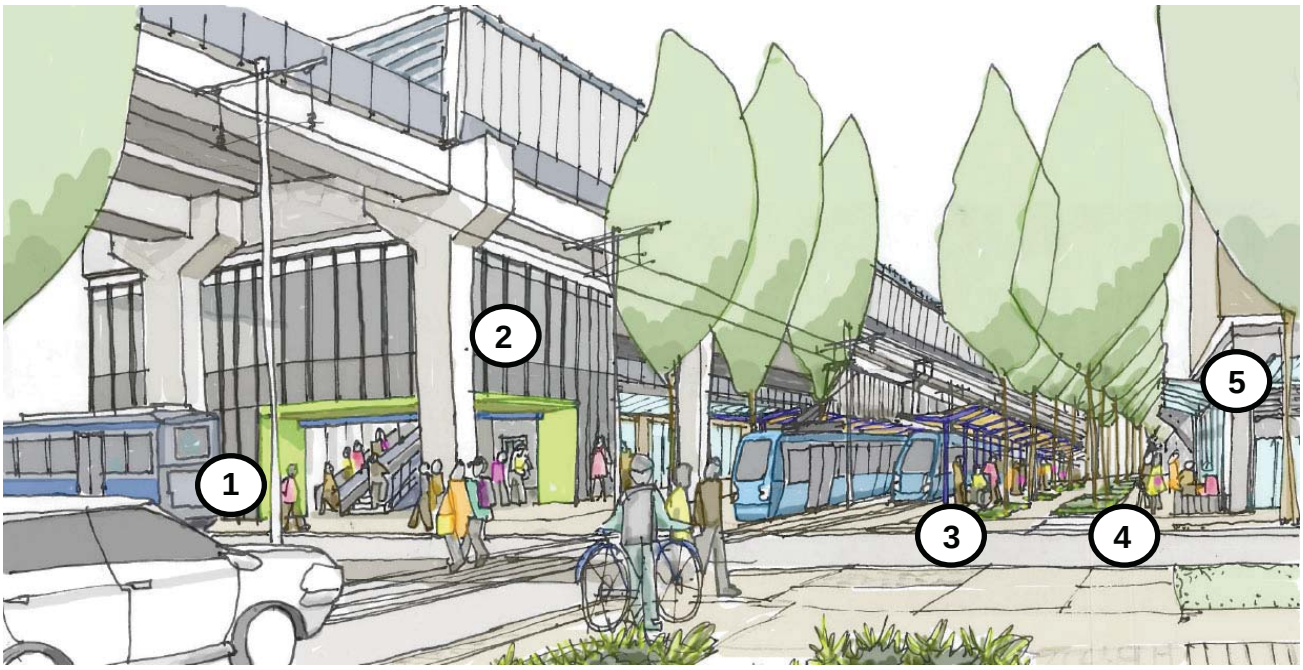


Map 10: Mayors' Council Vision for Transportation

City Parkway: City Parkway is envisioned as the hub of the LRT system and will incorporate a pedestrian only station zone between 102A Ave and 103 Ave. This zone will achieve a high standard of urban design and include the LRT station, pedestrian connections to a renovated Surrey Central SkyTrain station and adjacent mixed use development.

Key Features along City Parkway

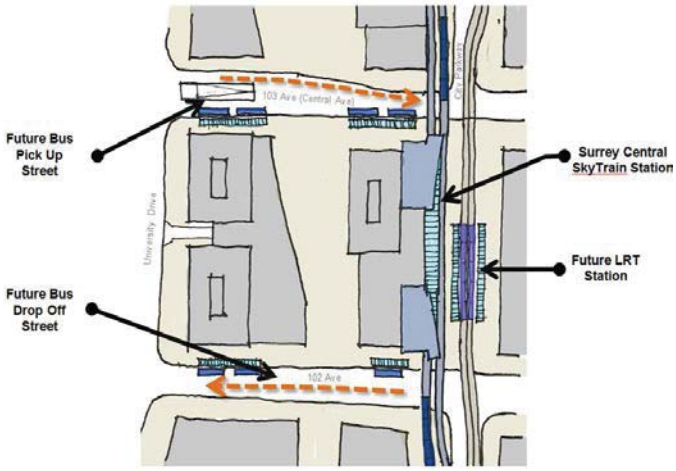
1. Bus Loop reconfigured to on-street exchange
2. Renovated Surrey Central SkyTrain Station
3. Open Style LRT Station Platform Interface
4. High Quality Pedestrian Realm
5. Mixed-use Development & Active Uses



Sketch Shows Future City Parkway with Key Features Highlighted

Surrey Central Exchange: TransLink, in partnership with the City and Simon Fraser University have developed a plan to reconfigure the Surrey Central Exchange. The off-street fenced bus loop will be removed and replaced by an urban style on-street transit couplet utilizing 102A Ave and 103 Ave with off-street layover facility. The proposed design will accommodate the increased pedestrian flows and improve the urban design of the area, better integrating transit service into City Centre's urban form, rather than segregating transit service.

The replacement of the fenced bus loop with an on-street couplet will also facilitate the redevelopment of the Centre Block, removing a major physical and visual barrier and allowing for new pedestrian connections, a high quality public realm, and off-site bus layover.



Wayfinding and Signage: Wayfinding and signage throughout City Centre will direct pedestrians towards the transit facilities. TransLink maintains its own wayfinding and signage system within its transit facilities.

Local Community Shuttle: The City envisions at least one new community shuttle route to support residents moving throughout City Centre in areas that are currently underserved by transit. The shuttle would provide a crucial link to other transit service such as SkyTrain, LRT, and B-Line services. It would also provide local access to unserved commercial and recreational areas within City Centre.

Transit Priority: Transit priority measures will be considered in key areas in City Centre to improve the travel time and reliability of LRT and buses.

Taxi, Ride Sharing and Car Sharing: As City Centre evolves into a network of walkable, mixed use districts and neighbourhoods, there is the opportunity to reduce personal vehicle ownership through the provision of taxis, ride sharing and car sharing. These services will be driven by market needs and the business plans of service providers, who best understand the conditions necessary for success. The City can facilitate these travel options with the provision of regulated parking, reduced parking requirements in new developments, and facilitating the provision of infrastructure through redevelopment in private and public rights of way.

Map 11 City Centre Transit

5.5

5.6 CYCLING

A network of new facilities for all ages and abilities will make cycling attractive to a larger segment of residents

Cycling is the fastest growing mode of transport in the Lower Mainland and modest investments have enormous potential to cost-effectively reduce congestion and improve public and environmental health. The missing ingredient is the lack of facilities for all ages and abilities.

Despite an extensive network of bike lanes, City Centre's existing mode share is less than 1%, and the cyclist injury rate per trip is 50% higher in Surrey than the regional average. A limited number of people, mostly male, are comfortable sharing the lane with motor vehicle traffic or even cycling in painted bike lanes.

Some end-of-trip facilities are available, and the City has installed bike boxes, bike detection and green painted green conflict zones at select locations. An all ages and abilities network has been started with the pilot of cycle tracks on 105A Ave. and sections of the BC Parkway under the SkyTrain guideway and next to City Hall and the Library.

The vision for cycling in City Centre includes a fine grained network of separated all ages and abilities cycling facilities on all arterials and collectors.

105A-Avenue Cycle Tracks- Looking West

Framework for Change

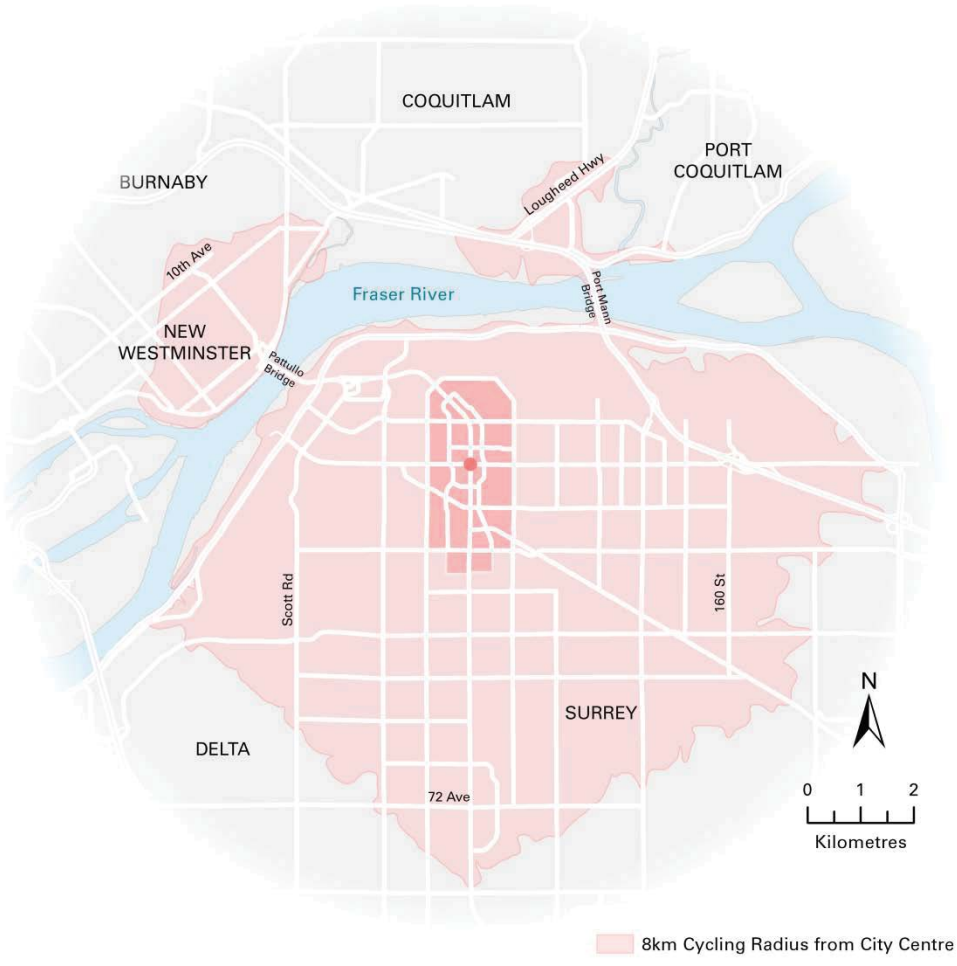
The City's Cycling Plan provides a blueprint for the cycling initiatives in City Centre, identifying actions for Change including:

- Review of Zoning By-Lay and new parking standards for bicycles,
- Creation of convenient connections and circulation through the creation of a finer grid of facilities, and
- Provision of new end of trip initiatives, partnerships, and facilities.

Local research indicates that 40% of people including women and children are interested but concerned about safety and prefer cycling facilities that are separated from traffic.

All ages and abilities cycling facilities also support Surrey's Child and Youth Friendly City Strategy, by enabling young people to safely navigate their community on their own. Buffered, segregated cycle tracks will form the majority of the cycling network in City Centre, while multi-use pathways will primarily provide connections between parks for families and recreational cyclists.

There is the opportunity to provide segregated cycling infrastructure, additional bike racks, and the integration of end-of-trip facilities in new developments. The Regional goal is for 15% of all trips less than 8km being made by bike.



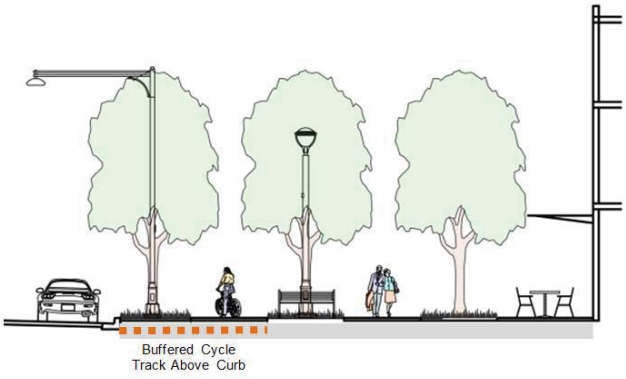
Map 12 City Centre 8km Cycling Radius

5.6

Infrastructure Measures

Cycle Tracks: All ages and abilities buffered cycle tracks will be located on all arterials and collectors. Designed in a way that does not to require additional right of way, they reallocate the space currently used for non-motorized transportation and bring cyclists to a safer place above the curb, rather than in a space shared by motor vehicles with only a painted line for separation.

Multi-Use Pathways and Greenways: Multi-use pathways, both shared with and separated from pedestrians, will provide a recreational active transportation link between green spaces in City Centre and beyond. Arterials with greenways will have a double row of street trees. Other greenways can be composed of natural building materials and will provide off-street connections to parks and natural areas, often using existing utility corridors and park space. Additional greenway connections will link the City Centre cycling network to the urban forest – Green Timbers Park – to provide recreational cycling opportunities.



Bike Parking Requirements and End of Trip Facilities: New residential and commercial bike parking standards including visitor parking will support the regional mode share targets and recognize that the level of engagement in active transportation is a key determinant of public health. Secure wheel-in/wheel-out parking – not requiring the cyclist to lift the bike to park it – with sufficient circulation space, and safe, secure, well-lit facilities are key to attracting greater numbers of cyclists.

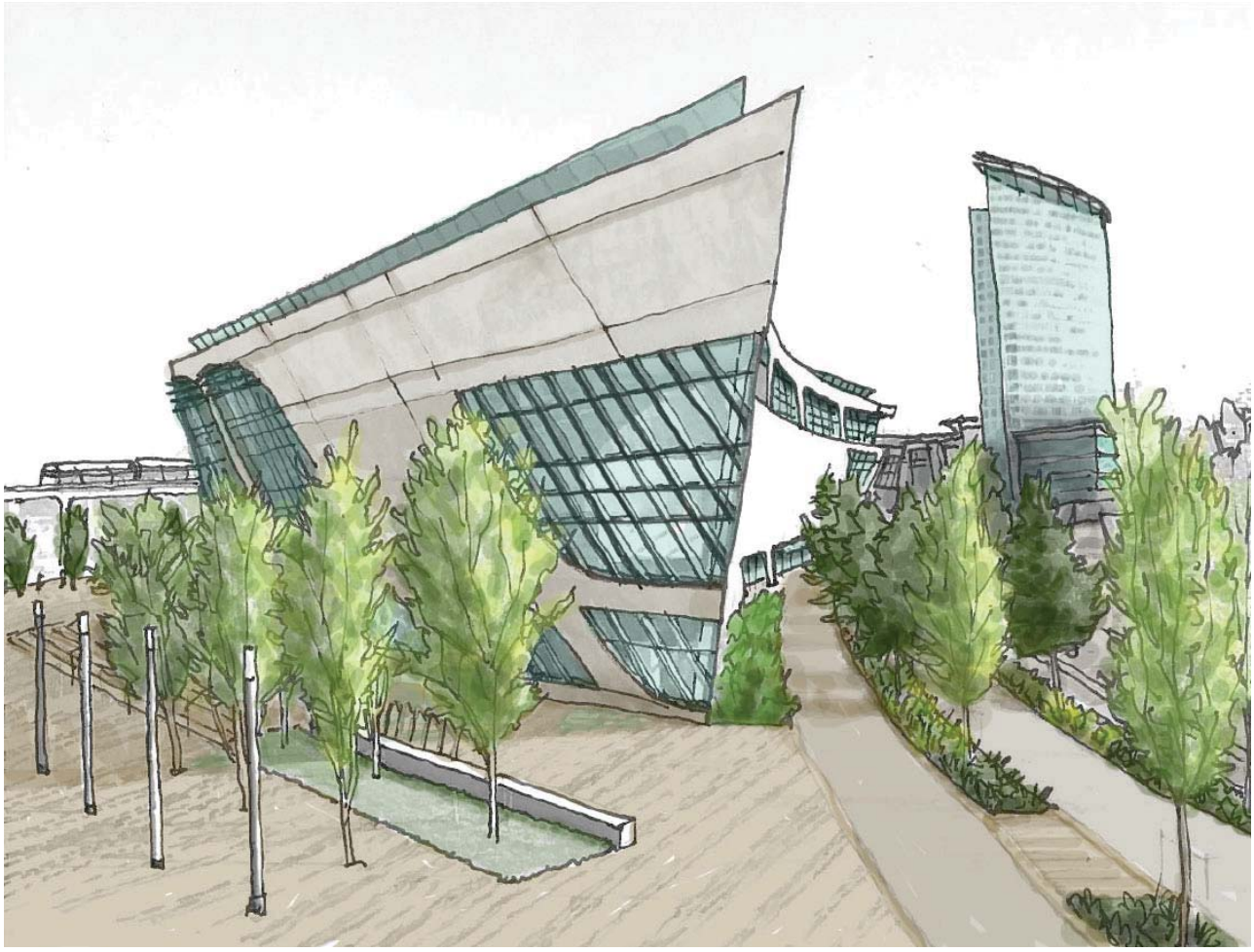
Bike Stations at SkyTrain Stations: The City will partner with TransLink to explore opportunities to provide bike stations at all City Centre SkyTrain and LRT stations.

Non-Infrastructure Measures

Bike Safety Education: Fostering a cycling culture through the continued promotion of safe cycling as a means of transportation will lead to more cyclists on the road and greater levels of safety.

Signage and Road Maintenance: Improved wayfinding and signage make it easy to navigate in and through City Centre. Bike lanes and cycle tracks will be swept and cleared of snow to maintain safety.

Bike Sharing: The City will explore the opportunity for a bike sharing system in City Centre, either as a stand-alone system or in conjunction with other regional partners. This is a longer term goal as the success of any bike share system will be dependent on the speed at which segregated facilities are able to be implemented, and overcoming the barrier presented by current provincial helmet legislation.



Sketch of BC Parkway Multi-Use Path (BC Parkway) on University Drive

5.7
VEHICLE CIRCULATION

Private motor vehicles supported by a robust road network will continue to play a key role in City Centre's transportation mix.

While there will be substantial growth in sustainable modes, Metro's Regional Growth and Transportation targets acknowledge traffic volumes in City Centre will see some increase over the coming years.

The current road network in City Centre was primarily designed to move motor vehicles through City Centre. Much of the historical built form and infrastructure encourages residents to own a car, as distances are too far to walk and a poor pedestrian environment discourages walking.

Traffic congestion is an issue in key areas of the City Centre, in part due to an incomplete arterial road network. In particular the incomplete inner and outer ring roads and the lack of a complete finer-grained road network leave drivers with few choices resulting in increased congestion. Key intersections are monitored by CCTV cameras, allowing staff to detect traffic volumes and adjust for events that range from congestion to emergency vehicle access. However, the completion of the road network is needed to fully address the congestion issue.

The recent completion of the South Fraser Perimeter Road (Highway 17) has resulted in a significant decline in truck traffic using the 104 Ave to King George Boulevard corridor. City Centre's geographic location centred on King George Boulevard in North Surrey and proximity to the Patullo Bridge also put it a crossroads for goods movement.

City Centre is envisioned to have a safe, resilient, fine grained road network that accommodates all modes of transportation, including vehicles.

Framework for Change

Vehicle circulation in City Centre can be optimized through measures that will increase the people carrying capacity and efficient movement through City Centre, redistribute unnecessary through traffic, and improve safety for all modes.

Infrastructure Measures

Finer Grained Street Network: By increasing the density of route choices within City Centre there will be a more distributed traffic pattern, providing flexibility for traffic movements and resiliency when routes are blocked by construction or collisions. As noted in section 5.2 Street Network, a development levy is proposed to help equalize the cost of delivering the finer grained network amongst all properties in City Centre. Further details are contained in the Section 11 Servicing & Financing.

Designing Streets for Multiple Modes: As redevelopment occurs, improved all ages and abilities walking and cycling facilities will increase travel choice, reducing the number of people who choose to drive and free up space for those who must drive. Revised dimensions for travel lanes and other design elements that influence driver behaviour will improve safety.

Non-Infrastructure Measures

Managing Technology: The City will continue to manage vehicle circulation through technology. Using Intelligent Transportation Systems, the City will optimize the new road network as it evolves.

Revised Speed Limits: New speed limits will improve road capacity and support the City's goals of encouraging more trips by walking, transit, and cycling. As noted in Section 2.2 Policy Context, one of the objectives of the City's Public Safety Strategy is to increase transportation safety; the speed at which vehicles travel directly impacts the safety of a street.

In addition, research has shown that traffic moving at more urban speeds actually increases the capacity of the road network, as less space is needed between slower moving vehicles.

Alternative Truck Routes: The South Fraser Perimeter Road and 128 Street extension will support the relocation of non-local traffic, and remove many of the heavy trucks currently travelling through City Centre that have origins and destinations elsewhere.

Map 13 SFPR & 128 Street Extension

5.7

5.8 PARKING SUPPLY AND MANAGEMENT

Parking management balances the relative convenience and price of parking compared to other modes of transportation to influence individual choices and encourage modal shift.

As the City Centre evolves, there will be a change in travel demand as transit increases, more people live and work in City Centre, and competition for curb space between various uses such as buses, taxis, short term parking etc. increases.

Today, City Centre residents make about two-thirds of their trips by private automobile, and more than half commute to a workplace located outside of Surrey. While SkyTrain provides convenient access to destinations along the various SkyTrain lines North of the Fraser including downtown Vancouver, the lack of transit connections to other destinations, particularly in the South of Fraser area, means that many people have no other choice but to drive.

Ample surface parking in City Centre helps sustain this demand and serves the existing big box land uses — although there is often more parking supply than needed. Older parking facilities generally lack "pedestrian-friendly" urban design features such as pathways, landscaping and appropriate lighting. Fencing between parking lots and the lack of a fine grained, comfortable and convenient pedestrian network mean fewer trips made on foot, even if destinations are nearby. Off-street parking is dominated by surface parking, with a significant portion of the land in City Centre given over to surface parking.

Due to its proximity to the Skytrain, various parking management strategies have been implemented in City Centre. For example a provision for a 20 percent relaxation of the standard parking requirements has been allowed for City Centre.

Pay parking has been implemented in select public and private off-street parking lots and there is limited on-street pay parking around the SkyTrain stations and in the Surrey Memorial Hospital precinct. There are also a limited number of car share spaces near existing SkyTrain stations.

The City's parking management strategies are envisioned to be complimentary to transit, taxis and shared ride services. They will work to achieve transportation, urban design, affordability and environmental objectives including choice and equity of access.

Framework for Change

Specific actions have been broken down for on-street and off-street parking.

On-Street Parking

Public land is a City asset and as City Centre develops it will need to be allocated carefully. Whereas in the past it was possible to offer universal access to on-street parking at low or no cost, moving forward it will be important to ensure turn over to maximize the effectiveness of this valuable resource for all downtown activities. The following actions serve as the building blocks to efficiently maximize the management and use of on-street parking in City Centre:

- Ensure a mix and variety of on-street supply to support City Centre short stay, loading, unloading, daytime, nighttime, and weekend uses.
- Regulate on-street parking spaces to favor higher-priority uses and encourage turn over.
- Price parking and adjust rates as needed to maintain optimal utilization.
- Explore opportunities to utilize technology such as the My Surrey app and vehicle guidance systems.

Off-Street Parking

The nature of off-street parking will change as land values increase and development puts more emphasis on the efficient use of land. The following actions serve as the building blocks for off-street parking management in City Centre:

Parking Requirements & Regulations

- Explore opportunities to right-size off-street parking requirements, in particular with supportive land uses and near rail transit stations and along frequent transit corridors, to assist with the economic viability of projects and affordability of housing units in combination with cash in lieu for reduced parking.
- Design surface lots and garage entrances to minimize their urban design impact.
- Review requirements for bicycle parking and changing facilities in new development.
- Develop special regulations for delivery and loading areas.
- Allow shared use of public parking in partnership with private uses.
- Develop sustainable design guidelines for parking facilities including surface lots.
- Explore cash in lieu as a tool to fund transportation alternatives.

Parking Supply

- Explore opportunities to configure city properties as interim parking supply until transit service improves. The City property could then be more attractive and made available for redevelopment.
- Encourage use of underutilized parking facilities for park-and-ride.
- Monitor downward trend in supply and demand – to anticipate changes to parking supply requirements.
- Encourage major employers and post-secondary institutions to develop “ travel plans” that promote the use of transportation options and reduce the need for off-street parking.

Car Share/Ride Share

- Encourage provision of priority parking for designated carpools, ride sharing and potentially autonomous vehicles in large parking facilities.
- Provide free or reduced cost access on and off street for car share parking.
- Explore opportunities to support the expansion of car share operations in City Centre.
- Explore opportunities for development led provision of car sharing spaces.

SECTION 6
Parks & Open Spaces

6
PARKS & OPEN SPACES

Parks and open spaces have been organized into the neighbourhoods and districts of City Centre, each with their own emerging identity and scale.

This section describes the network of parks, open space and pathways that help define each of the neighbourhoods and districts.

6.1 OVERALL VISION

Parks and open spaces will support an active, healthy and socially vibrant City Centre.

The City Centre Parks and Open Space Plan provides the framework for a healthy and active City Centre, where every resident is within a safe and pleasant walking distance to a park or public open space. These places will support a range of amenities and provide a platform for recreation, community and social uses. Not only will they be beautiful, they will support celebrations and gatherings, and will be designed with flexibility to meet the changing recreational needs of the City Centre's diverse and growing population.

Parks and open spaces within each district and neighbourhood will be designed and programmed to foster a distinct sense of place. In the Gateway District, the natural beauty of the Bolivar Creek ravine will connect residents with nature, while Downtown public celebrations and community gatherings will animate the plazas and create a vibrant atmosphere.

Each park and open space in the plan will be part of a network of green spaces that provide the community with an outlet for recreation and relaxation. This network will be connected together through an integrated system of greenways, cycle tracks and trails, animated with engaging public art, comfortable street furniture and pedestrian scaled lighting.

Adjacent development will acknowledge public space with thoughtful urban design and by providing publically accessible open spaces. Together, these smaller elements will create a finer grained network of public open spaces that will integrate with the larger City Centre Parks and Open Space Plan.

Parks and open spaces in City Centre will also provide valuable ecosystem services. Larger parks, urban forests and riparian areas will provide hubs of biodiversity linked by boulevards and linear greenspaces providing a lush, urban tree canopy. Combined, this green network will improve air quality, store carbon, and mitigate the urban heat island effect. The network will also support a healthy aquatic ecosystem though the protection of riparian areas and biodiversity corridors, including the headwaters of Bolivar and Quibble Creeks. Salmon populations will thrive through habitat conservation and restoration, and will become a marker of a healthy and alive City Centre.

Holland Park Looking South East

6.2

CONCEPT PLAN

The Parks and Open Space Concept Plan features a variety of park types, interconnected with a network of pathways and cycle tracks.

The parks and open space concept plan for City Centre provides public open space within walking distance of all residents. The distribution and design of each park will recognize the needs of the surrounding neighbourhood, as well as the broader City Centre area. Acknowledging the future population and density of the urban core, the plan also envisions that the formal network of public parks and civic spaces will be supplemented with a variety of corner plazas and publically accessible open spaces, to be provided on private property through development. With each development site considered as an opportunity to contribute to public open space, a finer grain network will evolve to provide green spaces and opportunities for local play, rest and socialization.

This system of parks and open spaces will be connected through an integrated network of greenways, cycle tracks and pathways that provide residents with a range of active transportation options throughout City Centre, and within the region.

Key Components

The Parks and Open Space Concept is built on a hierarchy of key components, including:

- City & community level destination parks
- Local neighbourhood parks
- Creeks and natural areas
- Urban mini-parks and plazas
- Publically accessible private open spaces
- Greenways, cycle tracks & pathways
- Planted boulevards, with large tree canopies

Map 14 Parks & Open Space Concept Plan

6.2

6.3 PARKS & OPEN SPACES

The parks and open spaces within each district are the key components and defining features of the public realm.

The City Centre Plan has been organized into residential neighbourhoods and districts, each with its own emerging identity, function, and scale. This section describes the network of parks, open space and pathways that help define each of these neighbourhoods and districts.

Gateway

The Gateway district is defined by its namesake SkyTrain station, which is encircled with high density office and residential development. Nearby, to the west and northwest, Bolivar Creek forms a natural transition to the adjacent residential neighbourhood. This creek system supports a significant natural area and a unique ravine ecosystem, and presents a distinctive opportunity for neighbourhood identity.

Parks & open spaces in Gateway will be centred on Bolivar Ravine Park and the natural features within. The creek's north-south orientation presents an opportunity for trail and pathway connections, including a pedestrian bridge across the ravine. Future viewing platforms and other adjacent amenities will provide residents and office employee's opportunities for retreat and a connection with nature.

Key Components

1. Bolivar Ravine Park
2. Bolivar Creek & Ravine
3. Station Plaza
4. Surrey (BC) Parkway
5. Port Mann Greenway

Parks, Pathways & Natural Areas

Bolivar Ravine Park

One of the most interesting features of Surrey City Centre is the existence of fish bearing streams, including Bolivar and Quibble Creeks. Bolivar Ravine Park is located in the Northwest corner of City Centre, and is home to the headwaters of Bolivar Creek, a very unique ravine ecosystem. The park supports a significant tree canopy which provides both a pleasant setting for surrounding residents, as well as a distinctive view from King George Boulevard and the SkyTrain. Opportunities for pathways, centered on a new pedestrian bridge over the ravine, will provide linkages between the surrounding neighbourhood and the Gateway SkyTrain Station, as well as opportunities for natural area viewing.

Surrey (BC) Parkway

The Surrey (BC) Parkway is a 26-kilometre, multi-use path that connects Surrey City Centre with New Westminster, Burnaby and Vancouver. The Parkway also provides important local pedestrian and bicycle connections within City Centre and adjacent neighbourhoods. The BC Parkway will be a fully illuminated multi-use pathway.

Station Plaza

The Station Plaza is a large publically accessible open space that was developed with the Gateway Tower, adjacent to the SkyTrain station. The Plaza features a range of seating areas, greenspaces and water features ideal for enjoying lunch or taking a quick break from the office. Station Plaza, which is now a key component of the local open space network, is an excellent example of a publically accessible open space provided through private development.

Gateway District Parks & Open Spaces

6.3

Historic District

The Historic District has evolved over time into a street oriented retail precinct anchored on Whalley's Corner, at 108 Avenue and King George Blvd. Framing Whalley's Corner are two under-utilized public plazas and parking lots that serve the adjacent small scale retail. From the corner, a public pathway connects north to 136 Street, providing an important pedestrian link to the Bolivar Heights neighbourhood.

Whalley's Corner presents an opportunity to create the heart of the Historic District and a gateway to City Centre. The geometry of the intersection supports the development of two distinctive plaza spaces, as well as pedestrian connections to the surrounding neighbourhood. An improved pedestrian environment will result from the introduction of amenities through private redevelopment. Small scaled mixed use retail will animate the public realm, while buildings provide public amenities such as weather protection, public art, and street furniture.

Key Components

1. Whalley's Corner
2. Grosvenor Trail
3. Port Mann Greenway
4. Hawthorne Greenway

Plazas & Pathways

Whalley's Corner

The plazas at Whalley's Corner will be redeveloped with the surrounding neighbourhood. Building on the historic strength of the area, Whalley's Corner will provide a contemporary link to the area's history through finer grain place making details and design elements, adaptive re-use of historic infrastructure and features, and opportunities for both large and small scale public art.

Grosvenor Trail & Port Mann Greenway

Whalley's corner is connected to the surrounding neighbourhoods via the Grosvenor Trail, north through the old Grosvenor School site, and east-west along 108 Ave via the Port Mann Greenway. It is anticipated that the Grosvenor Trail will be integrated into the future redevelopment of the school site, as a vibrant pedestrian alley with spaces for retail, restaurants and cafes. The Port Mann Greenway links west to the Surrey (BC) Parkway and south into the City Centre via the Whalley Parkway.

Historic District Parks & Open Spaces

6.3

Bolivar Heights

Bolivar Heights has a quiet family-oriented character, which lends to a unique sense of place amongst the rapidly growing City Centre. The neighbourhood is situated between two large destination parks, Bolivar Heights Park in the north and Invergarry Park in the east.

Bolivar Heights will maintain its quiet residential character, which will be centered on Grosvenor Park, a new park that will provide social and recreational opportunities for local residents. The neighbourhood will also become greener than it is today, as larger canopy street trees are planted on the neighbourhood's wide residential boulevards.

Key Components

1. Grosvenor Park
2. Antrim Triangle
3. Grosvenor Trail
4. Port Mann Greenway

Parks & Pathways

Grosvenor Park

Centered within the Bolivar Heights neighborhood will be Grosvenor Park, a new neighbourhood park that will provide local and walkable amenities for surrounding residents. Its design will acknowledge the character and low density feel of the surrounding neighbourhood, and will provide family oriented amenities such as a playground, community garden and open lawn space. The ultimate balance of amenities within the park will be determined through community consultation.

Antrim Park

Antrim Park is a small triangular open green space that is a remnant of the area's radial street pattern. Located on Antrim Road between Hansen Road and 110 Avenue, the site is home to a beautiful meadow and a number of mature maple trees. The triangle will be retained as a small neighbourhood park, with opportunities to build on the site's natural amenities.

Bolivar Neighbourhood Parks & Open Spaces

6.3

The Bailey

The Bailey is home to Tom Binnie Park and the Chuck Bailey Recreation Centre, as well as Whalley Athletic Park. Combined, they provide over 7.5 hectares of community park space and athletic facilities, with a range of amenities that attract residents from surrounding neighbourhoods and the region.

As development occurs, this area will emerge into the athletic and outdoor recreation hub for City Centre. Continued improvements to the existing parks will provide a range of active amenities and opportunities for play and sport.

This park hub will have walking and cycling connections with the surrounding community via the Surrey (BC) Parkway, and the Bridgeview and Hawthorne Greenways.

Key Components

6. Whalley Athletic Park
7. Tom Binnie Park
8. Chuck Bailey Recreation Centre
9. Youth Park at The Chuck
10. Surrey (BC) Parkway
11. Bridgeview Greenway
12. Hawthorne Greenway

Parks & Pathways

Whalley Athletic Park

Whalley Athletic Park is a large community park and a major destination for baseball in the City. The park is the home of Whalley Little League, which is an important part of Surrey's cultural heritage. The park features a number of baseball diamonds, including a regulation sized competition field with bleachers. The park also has indoor batting cages, a multi-purpose field, mini-soccer field, playground, field house and washroom building.

It is expected that Whalley Athletic Park will evolve as the City Centre area redevelops, and will continue to contribute to the active lifestyles of residents in the area. The park will provide a balance of active amenities while retaining sufficient space to host regional, provincial and international tournaments and sporting events. Future park development will consider improved edge conditions and neighborhood linkages, as well as the formalization of park entry points and a central commons area.

Tom Binnie Park

Tom Binnie Park is home to the Chuck Bailey Recreation Centre which features an indoor gymnasium, community rooms, a senior's centre and a youth lounge. Outside, the Surrey Urban Screen, an off-site programming venue for the Surrey Art Gallery, projects digital and interactive art onto the exterior wall of the recreation centre. Next door, 'the Chuck' youth park, features a range of amenities aimed at children and youth, including a plaza style skate and BMX park, lacrosse and ball hockey box and a basketball court. The park is also home to an all season artificial turf soccer field.

The combination of indoor and outdoor amenities at Tom Binnie Park enables a range of activities and programming and provides a unique community amenity for City Centre. The park is linked the surrounding neighbourhoods via the BC Parkway and the Bridgeview and Hawthorne Greenways.

Bridgeview Greenway

The Bridgeview Greenway is a future 3.5-kilometre multi-use connection between City Centre and neighbourhoods to the Northwest. From University Drive it runs west along 105A Ave, linking Whalley Athletic Park with Royal Kwantlen Park, before turning heading north into the Bridgeview neighbourhood where it will link City Centre to the future North Surrey Ice Arenas. Through City Centre the Bridgeview Greenway will take the form of a sidewalk with separated cycle-tracks.

Bailey Parks & Open Spaces

- Park
- Park - Sport/Active
- Plaza
- Creek
- Multi-use Pathway
- Separated Cycle Track

The Bailey Neighbourhood Parks & Open Spaces

6.3

The Forsyth

The Forsyth neighbourhood is centered on Forsyth Road Elementary and Forsyth Park, with over 3 hectares (7.5 acres) of parkland and forested area. Nearby to the east, just outside of city centre, Hawthorne Park offers over 23 hectares (58 acres) of park amenities, including natural areas with forest trails, a playground, water park, display garden and picnicking areas.

Over time, Forsyth will develop into a place to enjoy an urban lifestyle, with proximity to park spaces, multi-use pathways and a vibrant retail and transit corridor along 104 Avenue. The neighbourhood will be connected via a number of multiuse pathways and cycle tracks, including the Hawthorne and Quibble Creek Greenways which will provide pedestrian and bicycle connections with the future LRT station on 104 Avenue.

Key Components

1. Forsyth Park
2. Rowberry Park
3. Forsyth Road Elementary School
4. Hawthorne Greenway
5. Whalley Parkway
6. Quibble Creek Greenway

Parks & Pathways

Forsyth Park

Forsyth is a future large integrated neighbourhood park site with a range of amenities to serve the broader community. The park will add to existing open space at Forsyth Road Elementary, resulting in over 10 acres of community greenspace, with opportunities for larger scale active amenities such as a sports field, tennis and multi-use courts. The site has also been identified as a potential site for a dog off-leash area. The ultimate balance of amenities for this new park will be developed through a community consultation process.

Rowberry Park

Rowberry Park is a small future neighbourhood park at 105A Avenue and Whalley Boulevard, at the junction of the Hawthorne Greenway and Whalley Parkway. This mini-park will provide a contemporary outdoor place that supports play and social interaction for the surrounding future high density neighbourhood. Amenities may include an urban plaza, seating, lighting and a bike repair station for cyclists using the Whalley Parkway and Hawthorne Greenway.

Hawthorne Greenway

The Hawthorne Greenway is a future 4.5-kilometre, multi-use connection between City Centre and neighbourhoods to the east. From University Drive and the Surrey (BC) Parkway, it runs east, linking Rowberry and Forsyth Parks with the Whalley Parkway and Quibble Creek Greenway. Leaving City Centre it continues through Hawthorne Park and into Guildford Town Centre where it connects with the Guildford Recreation and Aquatics Centre. Through City Centre the Hawthorne Greenway will take the form of a sidewalk with separated cycle-tracks, before transitioning to a multi-use pathway within Hawthorne Park.

Forsyth District Parks & Open Spaces

6.3

Central Downtown

The Central Downtown will form the urban and civic heart of City Centre. At its core a high density mix of uses will be connected through a network of urban plazas, from City Hall and the library in the north to Central City and Simon Fraser University in the south.

These plazas will offer opportunities for community programming, support large public events and celebrations, and provide social spaces for interaction and activity. The downtown core will be a pedestrian realm, connected to surrounding neighbourhoods through a multimodal transportation network of transit, multi-use pathways and cycle tracks.

Key Components

1. Civic Plaza
2. Central City Plaza
3. Larkin Park
4. Surrey Central SkyTrain & LRT Stations
5. Surrey (BC) Parkway
6. Central City Greenway
7. Whalley Parkway

Parks, Plazas & Pathways

Civic Plaza

Civic Plaza, together with City Hall and the Library, forms the heart of City Centre. The plaza offers flexible and programmable open space for community events and gathering, including the Surrey Urban Farmers Market, Party for the Planet and Surrey's Christmas Tree Lighting Festival. At night, the plaza is illuminated, featuring evening activities like concerts and light art projections.

The redevelopment of the Recreation Centre and the relocation of the North Surrey Arena's will enable the extension of the Civic Plaza to the south, ultimately linking with the Central City Plaza to create one of Metro Vancouver's largest urban plaza system.

Larkin Park

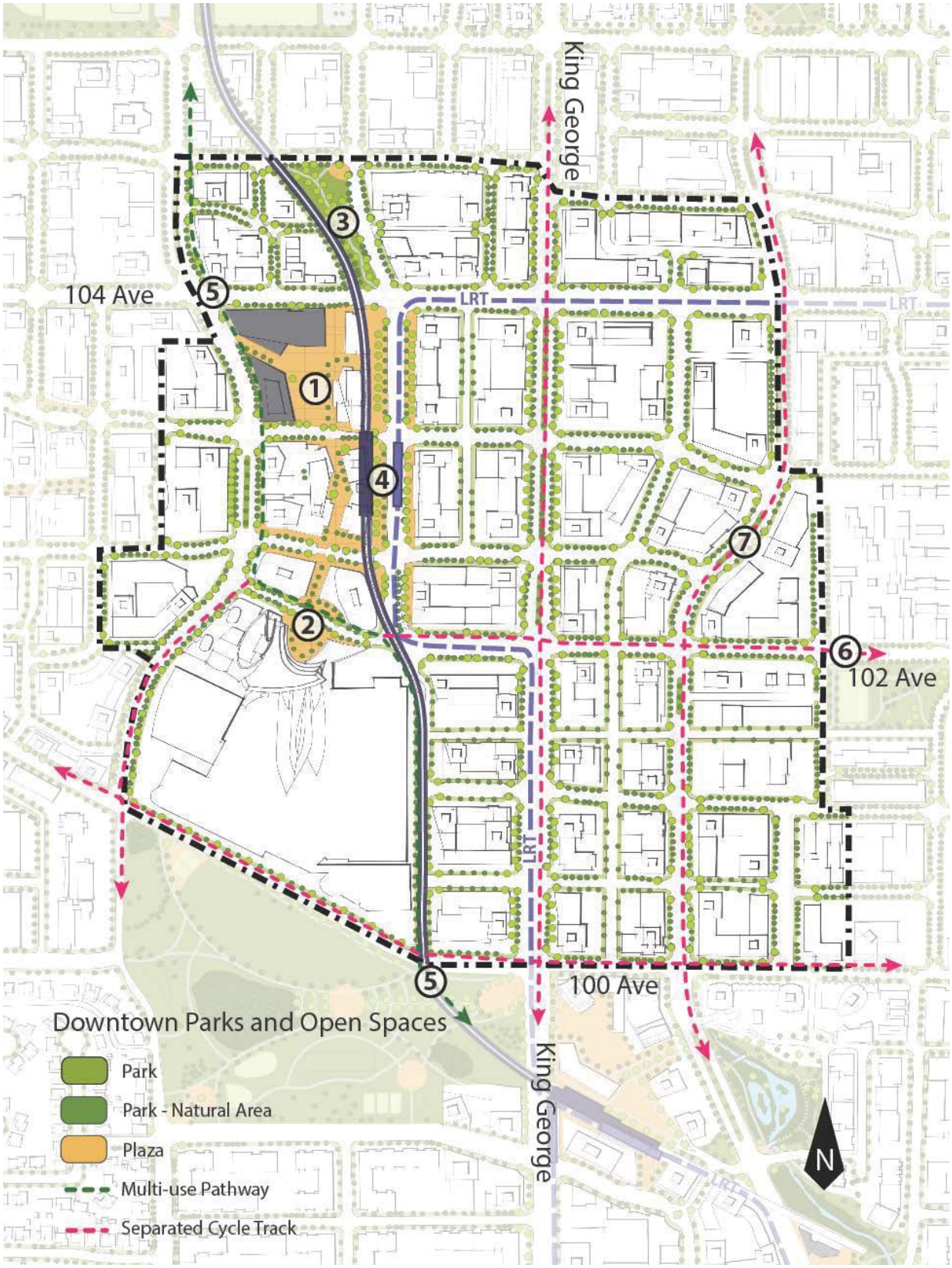
Larkin Park is a new neighborhood park that will provide local greenspace for neighbourhood residents. With the intensity of programming in nearby public parks and plazas, Larkin Park will provide a much needed passive greenspace, with amenities for casual and passive park use.

Central City Plaza

The Central City Plaza is a lively urban open space, connecting SFU and the Central City Mall with the Surrey Central SkyTrain Station and the Surrey (BC) Parkway. The plaza provides a venue for small and medium scale gathering and special events.

Surrey (BC) Parkway

The Surrey (BC) Parkway is a key active transportation link between the civic core and the rest of City Centre. The Parkway also connects with the Central City and Holland Park Greenways to provide broader linkages to North Surrey, Guildford and Newton



Central Downtown District Parks & Open Spaces

6.3

West Village

West Village is a quickly transforming high density residential neighbourhood. Outdoor open space in this compact precinct is centred on the West Village Park, the neighbourhood living room.

West Village Park will be supplemented with a variety of smaller plazas and publically accessible open spaces delivered through new development, as well as through proximity to larger public spaces, including Royal Kwantlen Park and the Civic Plaza. Together, these places will create a finer grain network of amenities, green spaces and opportunities for social interaction, exercise and play throughout the neighbourhood.

Key Components

1. West Village Park
2. West Village Mews
3. Royal Kwantlen Park *(west of plan area)*

Parks

West Village Park

The West Village Park will provide a contemporary urban space with opportunities for a plaza, passive use and children's play. This mini-park is also the future home of a District Energy Centre, which will provide surrounding buildings with a sustainable supply of hot water heating. It is expected that the energy plant will complement the park through strong architectural design and the incorporation of public art.

Royal Kwantlen Park

Although located outside of the City Centre Plan area (200m west), Royal Kwantlen Park is an important greenspace that is within walking distance for residents of the West Village and Chuck neighbourhoods. With over 14 hectares (35 acres) of park amenities, including a range of athletic facilities, passive open spaces and natural areas, this park plays a critical role in addressing the outdoor recreation needs for the City Centre Plan. Future park improvements will be undertaken with community consultation, and consideration to changing demographic needs. There is a historical connection with the Kwantlen First Nation that will be respected and incorporated into any future park planning.

West Village Parks & Open Spaces

6.3

Holland Park

Holland Park neighbourhood is predominantly a low density residential area, characterised by single family houses and a few multi-family developments. It is defined by its namesake park, a 10 hectare (25 acre) destination park that draws visitors from around the region for large scale events and festivals. East of Holland Park is King George Boulevard and the terminus station of the SkyTrain, which provides the context for the contemporary nature of parks and open space development in this area.

Development in the Holland Park neighbourhood will predominantly be focused around the park, and within walking distance to the SkyTrain. This puts a strong emphasis on the urban interface with the Holland Park, and provides the basis for the areas evolution into a vibrant and contemporary public space.

Key Components

1. Holland Park
2. Holland Park Greenway
3. Surrey (BC) Parkway
4. AHP Matthews Park
5. AHP Matthews Elementary School

Parks, Plazas & Pathways

Holland Park

At over 10 hectares, Holland Park is central to Surrey's evolving City Centre. The Park has played host to a number of large scale festivals and celebrations, including a Live Site at the 2010 Winter Olympics and Fusion Festival, Canada's largest annual multi-cultural celebration. The park is also host to music concerts, as well as community celebrations and gatherings.

In addition to hosting celebrations and events, the park boasts a range of amenities including a display garden, amphitheater, plaza, basketball courts and playground. As the park continues to grow and develop, additional amenities will be added, including opportunities for tennis, a water park, as well as additional gardens and passive open spaces. The ultimate balance of amenities within the park will be developed with consideration to changing demographics and ongoing community consultation.

Holland Park Greenway

The Holland Park Greenway is a 1.75 kilometer multi-use connection that link Holland Park and the Surrey (BC) Parkway with the Green Timbers Greenway on 92 Avenue. The greenway provides important pedestrian and bicycle connections with residential neighbourhoods in the southwest, as well as A.H.P Matthew and Queen Elizabeth Park.

Holland Park Neighbourhood Parks & Open Spaces

6.3

King George

The King George District is a vibrant transit oriented mix of office, commercial and residential development, built around a network of outdoor plaza space. The district is also home to the headwaters of Quibble Creek, which presents an interesting juxtaposition between urban development and nature.

King George will continue to develop into a vibrant and bustling transportation hub. The public realm in this district will feature a variety of busy pedestrian plazas and walkways, oriented around retail and entertainment. These open spaces will predominantly be realized as public open spaces on private development sites.

East of Whalley Boulevard, the headwaters of Quibble Creek provides a natural area enclave. A future park in this area offers unique opportunities to recognize the important of the headwaters through the development of an urban wetland.

Key Components

1. Quibble Creek Park
2. Quibble Creek
3. The Plazas King George
4. Whalley Parkway
5. Surrey (BC) Parkway
6. Quibble Creek Greenway
7. King George District Energy Centre

Parks, Plazas & Pathways

Quibble Creek Park

One of the most distinctive aspects of Surrey City Centre is the existence of fish bearing creeks. The King George District is home to the headwaters of one of these creeks, Quibble Creek. Quibble Creek is a tributary of Bear Creek and the Serpentine River, which flows over 20 kilometers from the park into Mud Bay.

These headwaters offer a fantastic opportunity to enhance and improve the creek's aquatic ecosystem, while also creating public spaces that celebrate and educate visitors on the creek's ecological importance. In addition to natural area improvements, public amenity opportunities include habitat viewing platforms, boardwalks, interpretative signage and seating areas.

The Plazas at King George

In high density areas, such as the King George District, there is an expectation that elements of the public realm are delivered as public open spaces on private development sites. Around the King George SkyTrain Station an integrated network of pedestrian plazas and public open space will provide a vibrant urban pedestrian realm, oriented towards office, retail and entertainment.

Whalley Parkway

In addition to the Surrey (BC) Parkway, the King George District is connected to the surrounding neighbourhoods through the Whalley Parkway. The Whalley Parkway is characterised by separated cycle track and higher level pedestrian connections along Whalley Boulevard, linking the Quibble Creek, Fraser Highway, Central City, Hawthorne and Port Mann Greenways along the way.

King George District Parks & Open Spaces

6.3

Medical District

The Medical District is separated into two distinct precincts separated by King George Boulevard: medical and professional services to the east and residential to the west. Parks and open spaces in this district will be developed and programmed to address the amenity needs of these aforementioned precincts.

The medical and professional services precinct, east of King George Boulevard, will support office and medical employees, in addition to residents of higher density apartment buildings. In this area, Cunningham Park will provide a central commons, supported by a variety of corner plazas and publically accessible open spaces realized through private and institutional development. Together, these open spaces will provide places to enjoy lunch away from the office or to relax and take sanctuary from the surrounding urban environment.

West of King George Boulevard, Queen Elizabeth Meadows Park will provide more typical amenities to support a lower density residential neighbourhood, as well as students from the adjacent secondary school.

Key Components

1. Cunningham Park
2. Queen Elizabeth Meadows Park
3. Quibble Creek Greenway
4. Holland Park Greenway
5. Quibble Creek
6. West Quibble Creek
7. Queen Elizabeth Secondary School

Parks & Natural Areas

Cunningham Park

Cunningham Park is central to the high density medical and professional services precinct. The proximity of this greenspace to the hospital and other medical services and care facilities will play an important role in reducing patient and employee stress and improving neighbourhood health and wellbeing. The program for the park will include opportunities for social interaction, spaces for quiet reflection and potentially amenities to support physical and mental rehabilitation of patients.

Queen Elizabeth Meadows Park

Queen Elizabeth Meadows is an existing 3 hectare (7.4 acre) neighbourhood park that provides local greenspace to the surrounding neighbourhood. As the area transitions into a higher density, additional amenities will be added, including opportunities for a dog off-leash area, community gardens, picnicking areas and additional park pathways and seating. The park will be connected to the surrounding neighbourhood through the Holland Park Greenway along 134th Street.

West Quibble Creek

The Medical District is home to West Quibble Creek, a tributary of Quibble Creek that flows into the Serpentine River and eventually out into Mud Bay. The creek and adjacent riparian areas will be conveyed to the City through development for conservation purposes. Adjacent development sites will acknowledge the creek and riparian areas through careful design, including opportunities for pathways and pockets of outdoor public open spaces.

Medical District Parks & Open Spaces

6.3

Green Timbers

Parks and open space in the Green Timbers neighbourhood is defined by the Quibble Creek Greenway and nearby Green Timbers Park and Urban Forest, both of which are significant components of the City Centre Green Infrastructure Network, and part of the City's broader Biodiversity Conservation Strategy (BCS). Combined, these parks will provide a significant amount of open space and natural area to support future residential development.

This neighbourhood will evolve as the gateway to Green Timbers Park and Urban Forest, the lungs of North Surrey. The Quibble Creek Greenway will support this vision by providing a corridor of open space that runs through the neighbourhood, linking with key greenways that lead into the Park and Urban Forest. Future residents of this area will have the opportunity to enjoy an abundance of greenspace with quick and easy access to a broad network of walking paths and forest trails.

Key Components

1. Quibble Creek Greenway
2. Green Timbers Park and Urban Forest
3. Dunn Park
4. Fraser Greenway
5. Bon Accord Greenway
6. Central City Greenway
7. Quibble Creek

Parks, Pathways & Natural Areas

Quibble Creek Greenway

The Quibble Creek Greenway is a ribbon of parkland that transects the southeast of City Centre, connecting neighbourhoods with parks and open spaces, walking pathways and transit. Along the way a variety of park amenities will be developed, such as community gardens, bike paths and dog off-leash areas. It will also provide an important ecosystem corridor, addressing the objectives of the BCS, and featuring a range of ecosystem restoration projects. The corridor will also form the backbone of a multi-use pathway network, linking the Central City, Bon Accord and Fraser Greenways to offer connections to amenities throughout City Centre and the broader region.

Green Timbers Park and Urban Forest

Green Timbers Urban Forest is one of the City's largest parks, offering over 183 hectares (452 acres) of forests, wetlands, lakes, grassland meadows and nature trails. Although technically not within the City Centre Plan area, its immediate adjacency offers City Centre residents with a unique opportunity to escape into nature to explore its many features. The Park is also home to the Surrey Nature Centre, which offers a range of environmental programs, workshops and events. Future park and Nature Centre improvements will include a destination nature playground, water park, exploration pond and wetland and new forest trails.

Dunn Park

Dunn Park is a new neighborhood park that will provide local and walkable amenities to surrounding residents. The park's design will acknowledge the medium-high densities of the surrounding neighbourhood by providing a balance of active park amenity with ample space for casual and un-programmed park use. Park amenities may include an urban plaza, mini soccer field, playground and passive open space, although the ultimate design and program within the park will be determined through community consultation.

Green Timbers Neighbourhood Parks & Open Spaces

6.3

SECTION 7
Culture

7
CULTURE

Culture plays an essential role in the creation of an interesting and vibrant downtown. Cultural facilities and activity supports social, educational, and economic exchange.

The following section describes the vision and strategic objectives to support new cultural catalyst projects, public art, historic identity, festivals and placemaking through community building, as well as implementation strategies to create a culturally vibrant downtown.

7.1 OVERVIEW

A strong vision and key strategic objectives will guide the development direction to support a vibrant cultural sector in Surrey's downtown.

Downtown areas create a critical mass of activity which facilitate cultural, social, educational, and economic exchange. As Surrey's City Centre transitions into a more urban landscape, cultural assets will play an essential role in contributing to a more interesting and vibrant downtown.

As Surrey's City Centre is in early stages of this transition, the concentration of cultural assets is relatively sparse compared to more established city centres. This presents opportunity for significant growth in the cultural sector, delivered through a balance of private sector redevelopment projects, public-private partnerships, and city-led initiatives.

In the future, the City Centre will feature a variety of cultural facilities, public art installations, gathering places, festivals, concert, and a thriving cultural sector economy. These cultural assets will play a crucial role in the transformation of City Centre, and will form vital components of the urban infrastructure necessary to realize the vision of a thriving, cosmopolitan downtown.

The following sections will set out the overall vision and strategic direction for culture in the City Centre. Components will include cultural facilities, cultural catalyst projects, public art, festivals and events, heritage, and place making.

Cultural Corridor Framework

An organizing framework for the cultural vision in City centre is the Cultural Corridor, which creates a unique hub of services and venues that concentrate arts and heritage activites and groups in a critical mass. The Cultural Corridor is centered along King George Boulevard, which runs through the central core of the plan area, from 96 Avenue to 108 Avenue. This portion of the corridor forms the northern part the city-wide Surrey Cultural Corridor, along King George Highway from City Centre to South Surrey.

The objectives of the Cultural Corridor are to facilitate ease of access to cultural assets for residents and visitors, promote collaboration and synergies amongst artists and cultural groups and to create an economic hub that draws investment and entreprenures to build the local creative economy.

As a framework, the cultural corridor helps visualize the arts & heritage landscape within City Centre. This structure allows opportunity to integrate, connect and support key cultural facilities, activities and pubic art. It also provides a platform from which to identify future projects, and to integrate and connect important cultural resources in the downtown. Map __ shows locations of Cultural Assets in the Cultural Corridor of City Centre

Surrey's Public Art Plan describes how this Corridor should have a higher level of design treatment applied to various street infrastructure features including: fencing, benches, bollards, bicycle racks and man hole covers. The potential for this concept is illustrated in detail in the *Surrey Operations and Infrastructure – Public Art Plan.*

Map 15 Existing Cultural Assets 2016

7.1

7.2 EXISTING CULTURAL AMENITIES

Many factors contribute to the cultural landscape of the downtown, including public facilities, private buildings, heritage influences, public art, festivals and celebrations.

Cultural Facilities

Cultural facilities in City Centre are private, public or partnership-run entities. Below is a list of the key cultural facilities in Surrey's downtown today.

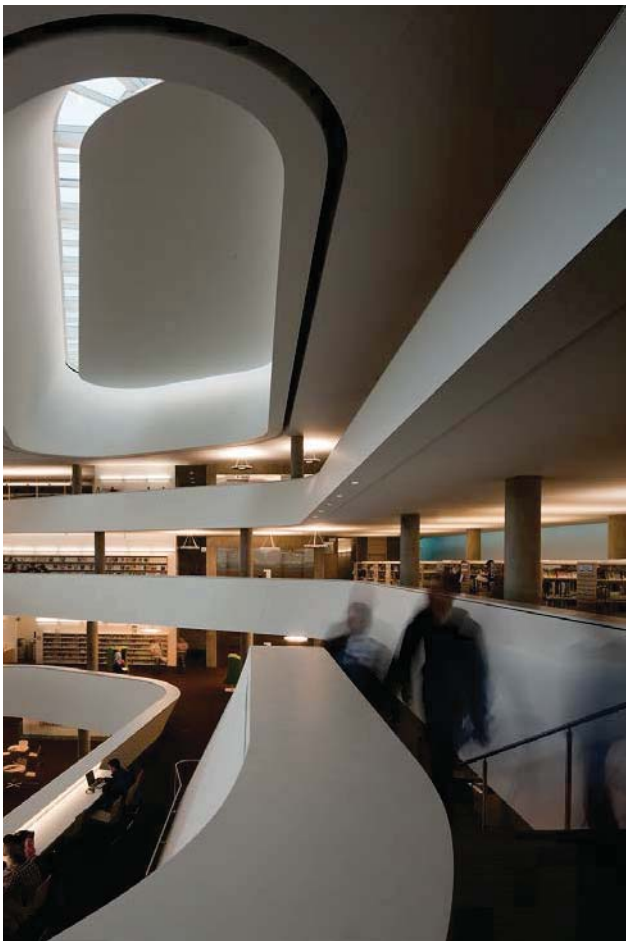
Centre Stage, City Hall

Centre Stage theatre is a 200-seat venue, located in Surrey City Hall. The theatre is used for Council meetings and is also used for live performance space by the larger community. Centre Stage is ideal for live music, film screenings, small-scale theatre and dance performances, as well as conferences, seminars and meetings.

Centre Stage is equipped with a 21' X 12' screen and a digital high definition projector.

Surrey Central Library

This iconic building, constructed in 2011, is a landmark of the Central Downtown District. It features 77,000 square foot of library space, including multi-purpose meeting rooms, study spaces, lounging areas, a computer learning centre, a children's department, teen lounge, collection spaces and a cafe. The library supports a variety of important social and educational services, including children and youth programs, immigrant and settlement services, language classes, technology classes, services for seniors and the vulnerable and business workshops. The library also serves as a Simon Fraser University satellite campus, and is host to a variety of community events.



City Parkway Arts Hub

Renovations to a City owned building at 10660 City Parkway will provide programming and administrative space for a number of local, not for profit arts organizations. The creation of this arts space will complement existing cultural amenities in City Centre.

Surrey Centre Arts Umbrella

Surrey Arts Umbrella offers programs that include dance, theatre, music, visual and applied arts. The school also offers art camps, community programs and early learning programs.

SFU School of Interactive Arts & Technology

The School of Interactive Arts and Technology (SIAT) at SFU is an interdisciplinary research focused school where technologists, artists, designers and theorists collaborate in innovative research and immersive study. A SIAT education combines the science of human experience, the analysis of media and culture, the creation of original and experimental works of art, and the implementation of new technologies.

SFU plans to expand the campus are currently underway. The expansion includes a new 5-storey, 16,066 square metre (172,933 sq. ft.) building for Sustainable Energy and Environmental Engineering programs. The project includes a 400- seat lecture hall located on the ground floor to serve the full SFU Surrey campus and is also intended to serve the broader Surrey community.

Rising Sun Social Innovation Centre & Gallery

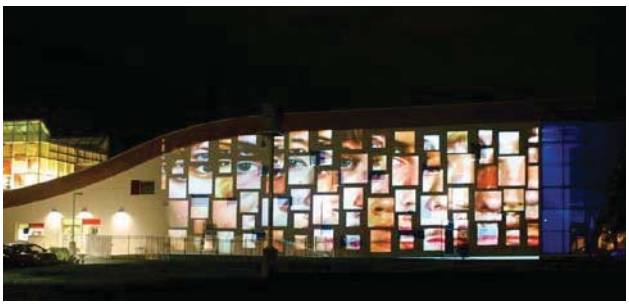
The Centre and Gallery is a 2 storey structure with a floor area of approximately 3000 sq. ft. that contains areas that can be used for the delivery of a number of different arts and culture programs and services. It also includes a studio and gallery for the preparation, display and sale of community 'fine arts', with particular emphasis on world artistic expression.

Public Art

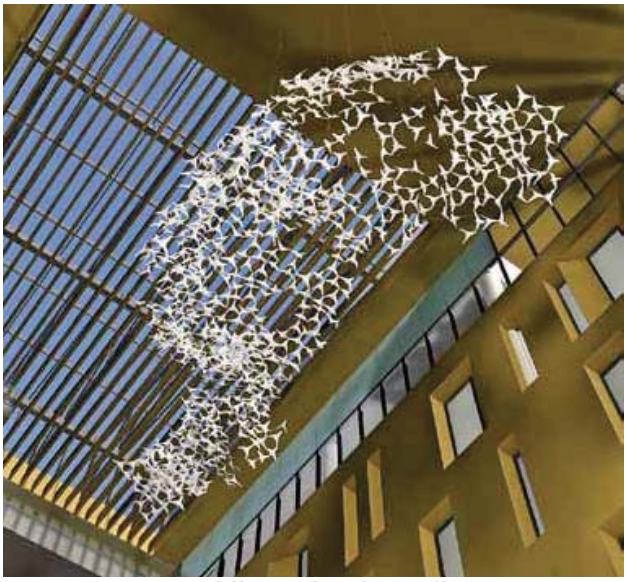
Public art installations animate the public realm and contribute to creating a memorable and unique landscape. They also engage residents in the interpretation and expression of what is important and significant to the community.

Public Art Walk

To encourage residents and visitors to experience multiple ideas and voices, a walkable route of varied public artworks can be found in Surrey's City Centre. This route extends from the artworks in Holland Park north along University Boulevard, and includes the artworks in City Centre Library, City Hall, and concludes with the artworks at the Chuck Bailey Recreation Centre.



Urban Screen at Chuck Bailey Recreation Centre



Public Art in City Hall

Public Art in Holland Park

Map 16 Existing Public Art Locations 2016

7.2

Heritage Sites

Whalley's Corner & Binnie Block

A key heritage area in the City Centre is Whalley's Corner and Binnie Block, located at 108 Avenue and King George Boulevard. In 1925, a small commercial area emerged in the north end of Surrey with Whalley's Corner Gas at the intersection of Grosvenor Road, Ferguson Road (108 Avenue) and King George Boulevard (then Highway). The development included a service station, a small general store, soft drink stand, and tourist cabins.

In 1947, his " Binnie Block" was one of the first commercial buildings along the highway, with the Cameo Theatre and a branch of the Bank of Nova Scotia. The same year also marked the official opening of a post office at Whalley's Corner After which came the Goodmanson Building (the Round Up Café) in 1949, and then the Dell Shopping Centre in the 1950's. The Dell Shopping Centre opened as the first of the centralized shopping centres in Surrey.

A mid-century modern design aesthetic emerged for this area during this time. Remnants of the original buildings are most evident in the area along Binnie Block and King George Boulevard between 108 Avenue and 105A- Avenue. These areas have predominately narrow storefronts and a Mid-century modern influence can be seen through elements such as flat roof lines, neon signs, low profile suspended canopies, simple clean building lines with muted colour palettes.

St. Mary's Ukrainian Greek-Orthodox Church

St. Mary's Ukrainian Greek-Orthodox Church (10765 135A Street) is on Surrey's Heritage Register and is significant as a landmark place of worship for over half a century. A large population of Ukrainian-Canadians were among the many groups of people that settled in Whalley, and they soon recognized the need for their own place of worship.

The church property was purchased through donations and fundraising, and construction on the church began in 1950, and was completed in 1955 with volunteer labour. The use of the historical style for the church, at a time when many churches chose to build in new modern styles, indicated a strong desire to maintain a distinct community identity.

Roll's Carpenter Shop

(13946 Fraser Highway) Roland Earl Wilfong and Olive Anne Wilfong acquired a block of eight approximately 1-acre lots between Pacific Highway (now Fraser Highway) and Townline Road (now 96 Avenue) immediately west of Nichole Road (140 Street). Shortly thereafter, "Rolls Carpenter Shop", likely named after the owner, was built facing Pacific Highway, later becoming the Trans-Canada Highway and now Fraser Highway.

Round Up Café

Goodmanson Building (Round Up Café) - has served the Whalley neighbourhood for over fifty-five years. Len Goodmanson built the original structure on the property in 1949, housing the Round Up Cafe, which Goodmanson owned until 1961. Since 1973, the restaurant has been owned and operated by the Springenatic family, who have maintained the essential roadside diner character, appearance and menu.

Typical of the era in which it was established, the large neon sign was a response to the width of the street and the speed of passing cars, enticing customers with its bold shape and colours. Such signs have seldom survived in connection with their original businesses; the Round Up Cafe and its neon sign are therefore a rare combination.

Photo of Historic Picture of Round Up Cafe

Outdoor Festivals & Events

City Centre is home to a number of major annual outdoor City events, as well as dozens of community festivals, concerts and gatherings. These are supported through a variety of public outdoor venues, including:

- Holland Park Festival Grounds
- City Hall Plaza
- Central City Plaza

In addition to community events and music concerts, City Centre is host to three of the City's major annual events, drawing thousands of visitors to the City annually.

Fusion Festival

Surrey Fusion Festival is one of Canada's largest multicultural celebrations. Over a weekend in July, this free festival features dozens of performances on multiple stages, with over 30 cultural pavilions featuring cuisine from around the world.

Photo of Fusion Festival

Party for the Planet

Surrey's Party for the Planet is one of the largest Earth Day celebrations in BC. This free festival is intended to inspire awareness for the natural environment and provide fun and engaging opportunities to get involved.

Surrey Tree Lighting Festival

Surrey's Tree Lighting Festival is a free family event centered on the lighting of the City's official Christmas tree and kick off the holiday season. The festival is supported by a variety concerts and events, including sleigh rides, food and fun activities all day long.

Diverse & Small-Scale Retail

Unique commercial areas can also create cultural identity and sense of place within City Centre. This can be seen through the establishment of small scale ethnic shops and restaurants located in the north end of the plan. Small scale and eclectic "mom and pop" businesses gives this district its unique character. These include multicultural grocery stores, specialty meat shops, a European deli, as well as ethnic restaurants such as African, Jamaican, Japanese, Vietnamese, Mexican and Salvadoran.

An African business area is also emerging at the north end of the district, where one can find groceries, restaurants and retail goods that are run by people who self-identify as people of African descent.

7.3 FUTURE DIRECTION

Culture will play an important role in building vitality, cultural capacity and energy of the City Centre

Cultural Catalyst Projects

Cultural Catalyst Projects provide strategic public investment in projects that would spark momentum for the continued transformation of the City Centre. These projects will focus investment where it can have the most impact in supporting private investment and enhancing the vibrancy and economic wellbeing of the City Centre. Significant cultural projects in the downtown will result in a strengthening of City Centre neighbourhoods and the realization of the Plan vision.

These projects can be city-led, introduced though new policies or funding, or part of a partnership structure with the city, and/or other levels of government, or major institutions, or be part of a private sector development. Some examples of cultural catalyst projects that have been initiated to date include the SFU Theatre, City Centre Library, Centre Stage, Civic Plaza, and the City Parkway Arts Hub.

Future Cultural Catalyst Projects for Surrey's City Centre include the following:

- Interactive Art Museum
- Performing Arts Centre
- Iconic public art in Civic Plaza
- Artists Hubs – live work studios, exhibition space, performance space

Interactive Art Museum

A new performing contemporary art gallery, located in the downtown, is one of the key cultural catalyst projects that have been examined to contribute to the cultural vitality of Surrey's downtown. The Interactive Art Museum (I AM) is intended to be a collaborative institution that engages and contributes to the community through participatory exhibitions and programs. Through various forms of applied and interactive technology, this community space would provide visitors with a creative learning environment, engaging them with artworks that provide experiences of beauty and artistic skill, as well as poetic entry points to engage with conversations about broad contemporary ideas and themes important to artists and residents in the region. Through partnerships with artists, other community organizations, schools and social service agencies, the Interactive Art Museum makes art accessible to everyone, connects diverse communities through art, and supports and strengthens community based initiatives.

In addition to advancing the cultural vision of this Plan, the development of a contemporary art gallery within City Centre will assist in decentralizing Art Services within in the City. This will enable a refocus of the current Surrey Arts Centre which will increase the Centre's programming and service capacity.

Performing Arts Centre

Another large cultural catalyst project envisioned for the City Centre is the Preforming Arts Centre. In 2012, Bing Thom Architects completed a feasibility study for a new performing arts centre for Surrey's City Centre. The study focused on a facility that would include a 1,200 seat theatre, black box studio and ample lobby space for hosting receptions and community events and celebrations. This flagship facility would be an anchor catalyst projects that would continue the revitalization of Surrey City Centre.

While the primary activation of the City Centre Performing Arts Centre would be focused on evening performances and weekend matinees, the intention would be that the Centre be a hub of activity during weekdays as well. Performing art education programming could be featured in the studio space during the day. Business meetings and seminars, receptions and community celebrations could take place in the lobby spaces and the studio. In addition street level retail space could be incorporated into the Centre's design in the form of cafés, restaurants and perhaps boutique stores. This mixed use approach would be designed to provide activation of the Centre and surrounding streets and neighbourhood during daytime hours throughout the week.

Iconic Public Art

A third cultural catalyst project is the realization of an iconic public art installation within the City Centre Plaza. An art installation at a world class scale, located within the core of City Centre, will inspire residents and visitors, energize an important public space and stimulate social interaction and discussion. It will also contribute to the City Centre Art Walking Loop by providing a central anchor art piece around which the loop can continue to develop.

Map 17 Future Cultural Assets

7.3

Public Art

Future public art installations and enhancements will focus on four initiative areas: Public Art Walk Enhancements, Public Art along Transit, Public Art along Greenways and Strategic Civic Art Sites.

Public Art Walk

The public art walking loop links together key public art installations and provides a pleasant and accessible opportunity for residents and visitors to view art, from Holland Park to the Chuck Bailey Recreation Centre. Additional enhancements along the alignment of the art walk, such as new art installations, building façade improvements, artistic street furniture and banners, will be added to enrich the experience, Area improvements, such as corner plazas, seating areas and architectural featuring, will be realized along the alignment of the art walk through the development of private property.

Civic Art Sites

Eight additional Public Art sites have been identified within City Centre. As redevelopment occurs, additional sites will be added.

- West Village District Energy Centre
- Surrey Civic Plaza
- Whalley's Corner
- Quibble Creek Greenway
- Coast Capital Headquarters at King George Station
- Surrey Central SkyTrain Station
- King George District Energy Centre
- Along University Boulevard

Quibble Creek Greenway

Public Art along greenways provide aesthetic rewards that are incentives for people to walk and cycle. They contribute to and create enjoyable and engaging journeys and serve as memorable landmarks that evoke a sense of place
The Quibble Creek Greenway is the central feature of the Green Timbers neighbourhood. Public art along the greenway will reflect and form a unique and unifying characteristic of this neighbourhood. This greenway will convey the idea of linear sculpture park that is viewed by walking or cycling. It will be neighbourhood-oriented and designed to be experienced from adjacent pathways.

Elements may include artistically designed seating opportunities, wayfinding and distance markers and viewpoints. The greenway will provide opportunities for a variety of artwork including sculpture, banner, and pavement art.

Public Art in Transit

High quality public art has been shown to improve the customer experience and give a sense of identity and vibrancy to public transit systems. It creates an inviting, comfortable space that encourages ridership by enhancing people's journey and perception of safety and sense of community identity.

The proposed LRT system should incorporate public art features that promote unique community identities and offer creative encounters for riders that are up-lifting, humorous and memorable.

Example of Adaptive Re-use of Heritage Sign for Transit Shelter Public Art

Map 18 Future Public Art Locations

7.3

Heritage Revitalisation

Consideration for Heritage Register

The following sites will be considered for Surrey's Heritage Register:

- **Rickshaw Sign**- (10522 King George Boulevard) This neon sign has been a landmark along King George Boulevard for many years. It was previously not considered for addition to the Surrey Heritage Register, however recent research indicates that the sign likely dates from at least the mid-1960s. This sign has potential for addition to Surrey Heritage Register, however further assessment is required.

- **North Surrey Medical Building** (9656 King George Boulevard)- Built in 1969, by Architect Peter Cole, this building is constructed of simple concrete material and glass and presents a muted colour palette.

  The architectural style represents the mid-century modern design aesthetic. Concrete is used to frame windows and doors and is shaped in a unique geometric form. The arches and columns and cantilevered areas are clad with concrete to add simplicity to the structure.

- **Galbraith House** (13756 112 Avenue)

Heritage Interpretation Opportunities

Potential Heritage interpretation opportunities exist at the following sites:

- **Whalley's Corner** -related to Arthur Whalley and the original 5 corners. Special street blades signs exist. There is opportunity for public art in the plaza related to the history, and also interpretation signage.

- **Dell Shopping Centre** -related to the significance of one of Surrey's oldest shopping centres.

- **Bolivar Hatcheries** -related to the Bolivar Family and their hatchery. The hatchery was quite a presence in the 40's and 50's as people drove down the King George Highway. It had a neon sign with fighting roosters on either side.

- **Cameo Theatre**-Part of Binnie Block, this building was built in 1954 and provided an important entertainment destination for the community. Heritage re-interpretation is recommended with redevelopment of the site. Opportunities could include re-creation of the " Cameo" signage and incorporation into new development.

- **Bolivar Mansion**-13453 111A Avenue (relocated) This house was once home to Haddon Bolivar and his family. The building has been significantly altered so the potential for restoration is very low Potential for interpretation related to the Bolivar family and the Florence Nightingale Hospital.

- Hassell Building (13655 & 13659 King George Boulevard). Built in 1963 for Mr. Hassell, who was a prominent Surrey figure. During the 1960's he was heavily involved in community groups.

Photo of Historic Whalley Corner Gas Station 1925

Photo of Historic Binnie Block 1950's

7.4

CULTURAL IMPLEMENATION STRATEGIES

There are several strategies to help support and implement additional Culture assets within City Centre.

Grant Programs

Neighbourhood Enhancement Grants

Neighbourhood grants are available city-wide, and would especially contribute to placemaking and creating a vibrant downtown. There are two categories of grants, a Small Projects Grant, and a Celebration & Community Activity grant.

Cultural Grants Program

Since the establishment of the Surrey Cultural Grants program in 2013 the City has provided funds to 100 unique arts and cultural organizations who offer a variety of creative and innovative programs and events to thousands of residents each year.

The vision of the Cultural Grants Program is to support and enhance arts and heritage in Surrey by:

- Building organizational capability and sustainability in existing and new cultural organizations,
- Investing in community-based cultural activities that promote awareness, access, participation and appreciation of arts and heritage, and
- Encouraging collaborative opportunities and partnerships.

Many of these groups animate the cultural spaces in City Centre including Centre Stage, City Room, the Civic Plaza, City Centre Library and Holland Park. These cultural activities employ local artists and have a positive impact on the development of Surrey's creative economy. Attendance at these events help residents connect to their community and promote social cohesion and cross cultural understanding

Private Development Public Art Program

In 2011, the Private Development Public Art Program was approved by Council. The program establishes a sustainable funding mechanism to support the City's commitment to public art though a required private development amenity contribution. This program applies to all multifamily residential developments with more than 10 dwelling units and commercial and industrial development applications involving the construction of a building with a total floor area of 1000 m2 (10,765 sq. ft.) or greater.

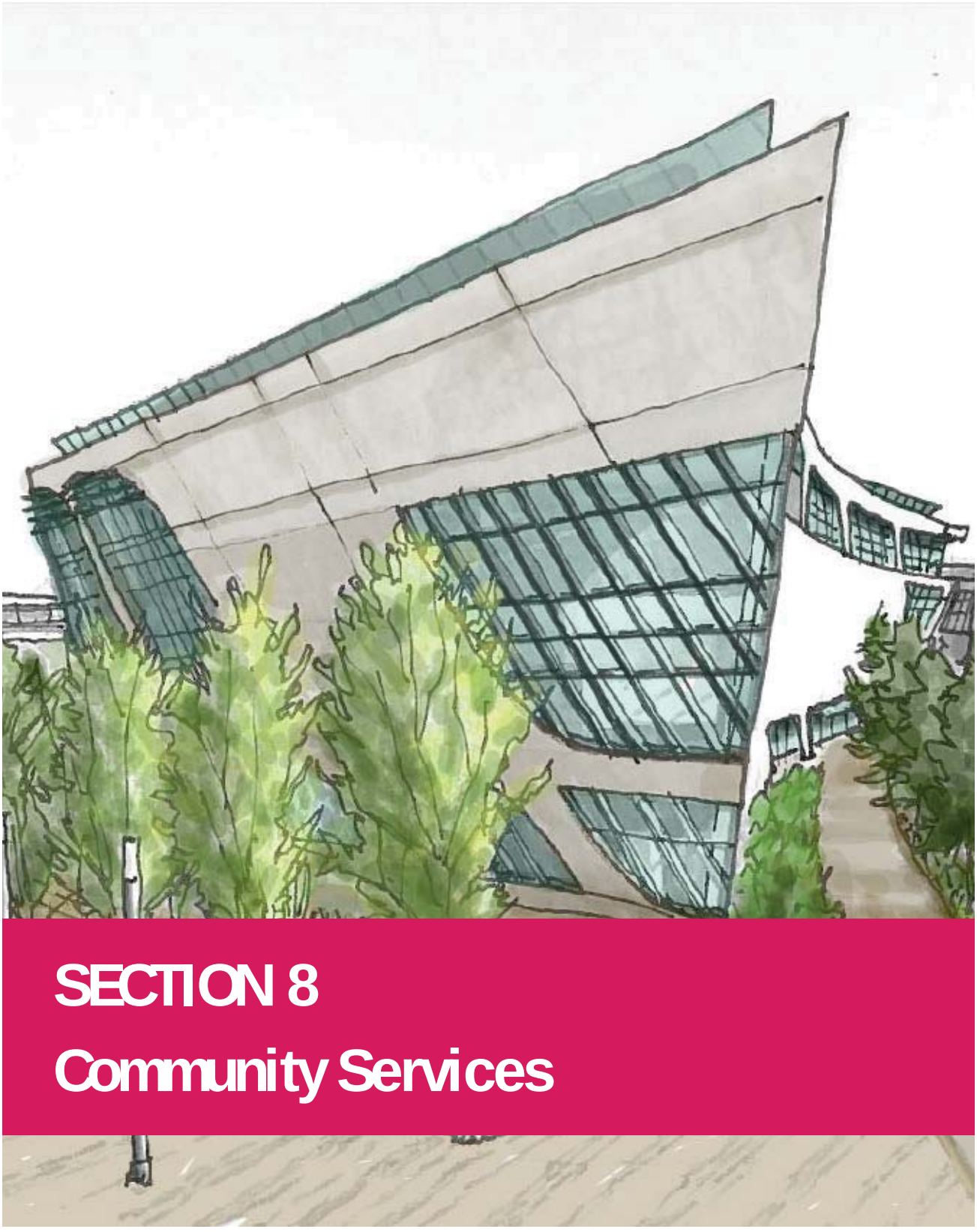
There are two options for locating private development public artworks. One option allows the art installation to be undertaken by the developer, the second option allows for payment of cash in-lieu of public art to the Public Art Reserve Fund. (see Private Development Public Art Policy for further details on the program).

Zoning

As part of the City Centre Plan update, amendments are proposed to the zoning by-law to allow for artist studios as a cultural uses. Amendments to the by-law include inclusion of a definition of " artist studio" as well as the addition of artist studio as a permissible use under Cultural Uses. Prior to the amendment, the zoning by-law defined Cultural Use as " a facility which provides for social enlightenment and includes museums and art galleries" . Adding the " artist studio" use will expand the cultural use definition.

In addition, all " Cultural Uses" will also be added as permissible uses in several commercial zones including Community Commercial Zone (C-8), Downtown Commercial Zone (C-35), and in City Centre, the Highway Commercial Zone (CHI).

Other zoning incentives and density bonus may be explored in the future as the City develops and redefines its density bonus policy.



SECTION 8
Community Services

8
COMMUNITY SERVICES

Community services and facilities are essential components for the overall health and well-being of City Centre residents.

The following section describes the existing and future public sector community and recreational services in City Centre. These facilities, including municipal community and recreation centres, libraries, health and educational services, provide the foundation for a connected, social and healthy City Centre, with the capacity to provide for the programming and community servicing needs of future residents.

8.1 OVERVIEW

Community services and facilities are essential components of the overall health and wellness of all City Centre residents.

Community services and facilities are essential components of the overall health and wellness of all Surrey City Centre residents. They provide year round amenities and programming that encourage active lifestyles, learning, opportunities for social interaction, and the capacity to provide dynamic programming that supports all ages and abilities. They also offer services to promote health and well-being and educational opportunities.

New and improved community and recreation facilities and services will act as community hubs that bring people together, supporting community capacity, volunteerism and a sense of place. They will be transformational health and social service centers that, in collaboration with community partners, will make a positive impact on real social issues facing the community. City facilities and services will welcome the entire community, and will strive to serve vulnerable individuals, families and children through fostering a sense of belonging and connection.

Expansion of public sector education facilities will provide increased energy to the public realm, with the addition of students on the street. This will also provide expanded cross-functional opportunities for businesses, research and other related public sector partnerships.

Partnerships with Federal and Provincial levels of government will allow continued support services for health, including mental health and addictions services for vulnerable populations.

8.2
CITY FACILITIES

Existing Facilities and Partnerships

The primary community and indoor recreation facilities in City Centre are discussed below.

North Surrey Recreation Centre and Arenas

Built in 1966, the North Surrey Recreation Centre is a fully accessible facility located next to the Surrey Central SkyTrain Station. The facility includes a 37 metre pool with aquatic amenities, weight room, fitness studios, two ice sheets as well as a variety of multi-purpose rooms. The centre offers patrons with a variety of registered and drop-in recreational programs, as well as preschool services and summer camps. Multi-purpose rooms are available for community bookings and events. This facility is approaching the end of its functional lifecycle and will need to be replaced in the near future.

Chuck Bailey Recreation Centre

Originally built as an Olympic legacy project in 2010, the Chuck Bailey Recreation Centre offers multi-generational programs and services designed to meet growing community needs. The facility offers a variety of registered and drop-in programs supported through a gymnasium, youth lounge, seniors centre and a range of multi-purpose rooms. The centre also includes preschool services, children's programming, and afterschool programs. Adjacent to the Chuck is a covered youth park, including outdoor amenities for skateboarding, BMX, ball hockey and basketball.

City Centre Library

Built in 2011, the City Centre Library is a landmark of the Central Downtown District. It features 77,000 square foot of library space, including multi-purpose meeting rooms, study spaces, lounging areas, a computer learning centre, a children's department, teen lounge, collection spaces and a cafe. The library supports a variety of important social and educational services, including children and youth programs, immigrant and settlement services, language classes, technology classes, services for seniors and the vulnerable and business workshops. The library also serves as a Simon Fraser University satellite campus.

Chuck Bailey Recreation Centre

Chuck Bailey Covered Skate Park

City Centre Library

Community Partnerships

In addition to existing facilities, the city also draws on community partnerships to deliver services in a multi-faceted manner, often beyond the operational scope and capacity of existing city programs.

Future Facility Enhancements and Partnerships

As Surrey's City Centre grows into a dynamic urban centre, the existing community services will be expanded and enhanced and existing community and recreation infrastructure will need to be replaced, upgraded. To meet the needs of an increasingly diverse population, the City's strategy to provide services and programming will be multi-faceted, and will involve partnerships and strategic relationships with other service providers, as well as collaborations with educational institutions and community organizations.

To effectively respond to this anticipated growth, the Parks, Recreation and Culture Department will develop a new 10-year Strategic Plan. This plan is intended to guide the City's community and recreation service delivery priorities through to 2028. The following outlines the plans for the three of the main city facilities in the City Centre.

North Surrey Recreation Centre Replacement

The existing North Surrey Recreation Centre is approaching the end of its functional lifecycle. This presents the City with a unique opportunity to plan for replacement facilities that correspond with the growth and demographic trends projected within this plan. As part of this process, the City will separate the arena and recreation center functions and relocate the ice rinks to a nearby location, adjacent to the Scott Road SkyTrain Station. This will provide opportunity for the future expansion of additional ice sheets, while also offering added flexibility for the redevelopment of the community, recreational and aquatic components within City Centre.

The new community centre will total approximately 60,000 sq. ft. and will be located within a highly visible location, somewhere in the City Centre. Currently, details for the relocation, including a location and implementation strategy, have not been finalized. The City is exploring potential partnership opportunities with the YMCA as well as the possibility of providing the replacement facility within a multi-use comprehensive development that may include housing, education and health services. The future program for this new facility will include an aquatics centre, weight room and fitness centre, gymnasium, multi-purpose rooms and administrative and support spaces. The facility will also feature a family development centre, aimed at providing a range of social services for children and families, as well as a central office for the delivery and referrals of other family oriented resources and services.

Chuck Bailey Recreation Centre Renewal

As the City Centre population grows and diversifies, it will be necessary to add new activity spaces to the Chuck Bailey Centre. Expansion plans include additional multi-use space, a second gymnasium and a fitness centre and weight room. Details of the expansion program will be based on consultation with community stakeholders and residents in the area. New and improved recreation facilities and programming will be coordinated and integrated with the existing facility.

City Centre Library

Surrey Libraries commits to engage with the community, to inspire the community and to strive for excellence through improved access and expanded technology. More meeting room space will be added to allow for expanded engagement and programming opportunities. The Library will identify community needs and invite participation in developing programs and services over the upcoming years with a focus on families and children, youth, newcomers, seniors, urban aboriginals and millennials. The City Centre Library will continue to collaborate with partners to improve social well-being with special emphasis on children and their caregivers. The library will also continue to foster digital literacy as technologies change.

Community Partnerships

As the City Centre continues to develop, opportunities to explore facility development and service delivery enhancements with partners such as Fraser Health, Simon Fraser University and Kwantlen Polytechnic University, may lead to a number of value added spaces and joint-use facilities. The provision of multiple, shared use spaces and the combining of services and programming will be explored as a means to decentralize services throughout the City Centre.

New and improved partnerships with other community service providers will complement, enhance and augment the community and recreation services provided by the City, and will increase the capacity to support a growing population and a dynamic urban centre.

Photo of Inside City Centre Library

8.2 PUBLIC SECTOR EDUCATION

Major Post Secondary Institutions

The Academic Precinct is beginning to emerge in the Central Downtown area with the expansion of two major universities in the core. Simon Fraser University (SFU) has been a key partner and catalyst in the transformation of the area, beginning with the construction of the Surrey Campus in 2003, and now with the expansion of the campus on a new site on University Drive. Kwantlen Polytechnic University (KPU) is currently planning a new campus to the City Centre within the 3 Civic Plaza building.

Simon Fraser University

Simon Fraser University currently has 470,000 square feet of space at the base of the Central City Tower in City Centre, and leases additional space in the Medical District. At this time, the SFU Surrey campus is over-capacity and has plans for future phases of expansion of Surrey campus.

Existing SFU Surrey Campus at Central City Mall

The next phase of expansion, currently in process, will allow for a new 5-storey building for Sustainable Energy and Environmental Engineering. SFU has applied for the federal government's new Post-secondary Institutions Strategic Investment Fund (SIF), which will provide $2 billion over three years to support excellence in research, innovation and environmental sustainability at campuses across Canada. The SIF will cover up to 50 percent of the project's eligible costs, with the remaining funding to be matched by the provincial government.

The building will house a 400-seat lecture hall, labs, office space, student recreation space and a café, totaling approximately 16,066 square metres (172,933 sq. ft.) of building floor area. The proposed SFU building is expected to have 320 undergraduate and 195 graduate students for a total of 515 FTE students. The building is expected to be complete for April 2018.

SFU's five year capital plan includes $355 million in a range of new capital projects for City Centre, including a Science Health and Technology Building, a Business Management Building and a Graduate Facility Building.

Kwantlen Polytechnic University

Kwantlen Polytechnic University (KPU) is planning to open a new campus in the City Centre in 2017, with its KPU Civic Plaza Campus, which will be located in the 3 Civic Plaza development.

The campus will occupy all 5 floors of the office podium and offer professional studies, upper-level business courses and post-graduate credentials.

Rendering of Future SFU Sustainability Energy & Environmental Engineering Building

Rendering of Future KPU Campus Located in 3 Civic Plaza Building

Secondary and Elementary Schools

There are three high school and eight elementary school catchment boundaries that cover the City Centre area (see **Map 18**). Many of the actual schools are located along the periphery of the plan boundary, with two elementary schools and one high school located within the plan area.

The Elementary Schools that serve the City Centre area:

- AHP Matthew Park
- Cindrich Elementary
- Forsyth Road Elementary
- James Ardiel Elementary
- Lena Shaw Elementary
- Old Yale Elementary
- Simon Cunningham
- K.B. Woodward Elementary

The Secondary Schools that serve the City Centre area:

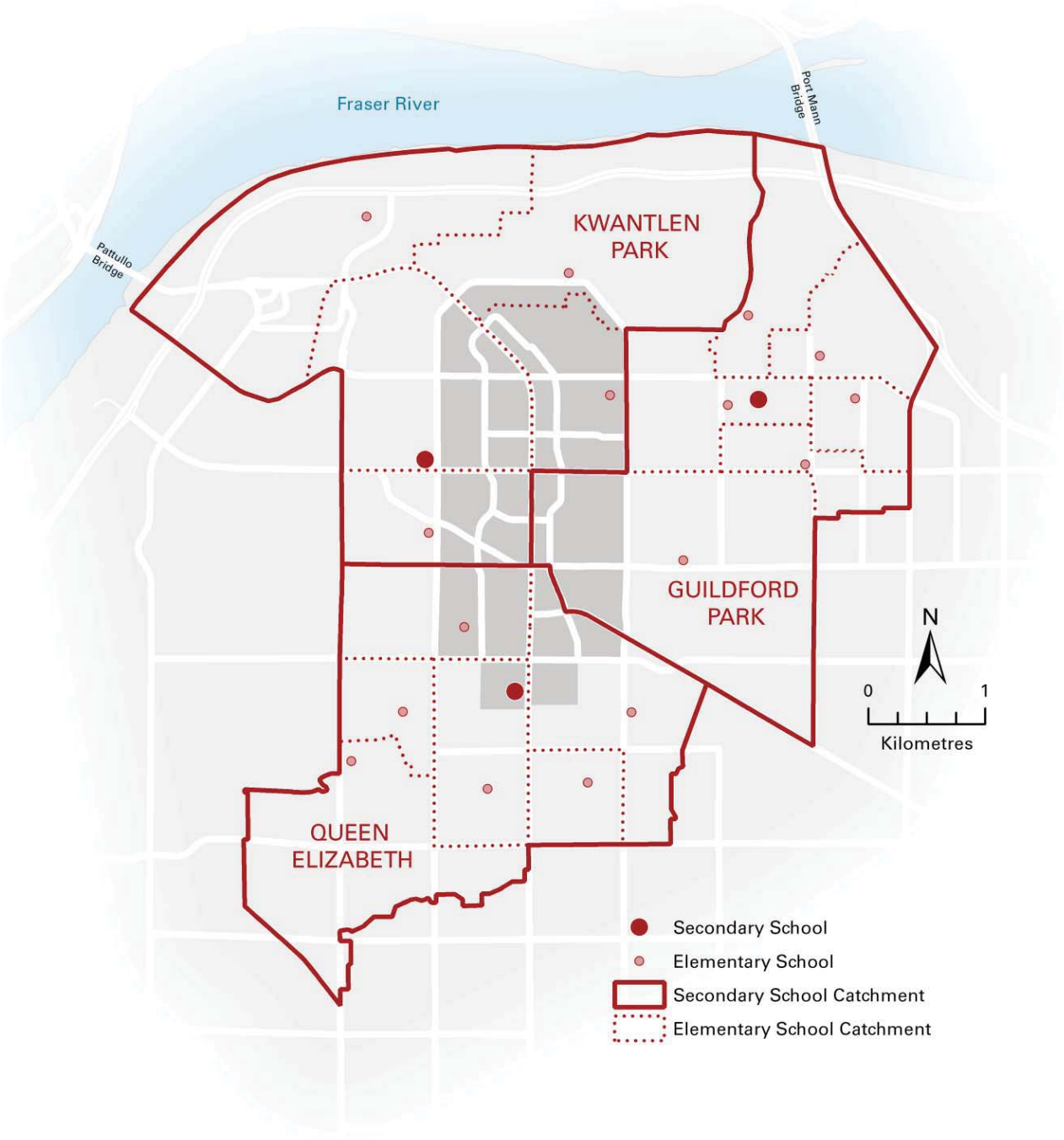
- Queen Elizabeth Secondary
- Kwantlen Park Secondary
- Guildford Park Secondary

A survey of the schools in the area suggests that the area still has capacity to accommodate growth within the elementary school population; however the secondary schools are nearing capacity. With the proposed build out, and combined yields remaining constant, is estimated that there will be 1,100 more students (670 elementary and 430 secondary) in 10 years.

Medium-term, the area does have that the ability to grow its school capacities within sites already owned by the schools district, should funding for additions become available from the Ministry of Education. There is also the potential to re-purpose sites being used for specially or alternate programs should those programs have suitable locations elsewhere.

In 20 years projections indicate there will be 1,400 more students (850 elementary and 550 secondary). In 30 years, 3,700 more students (2,250 elementary and 1,450 secondary). Yields will likely decrease as the proportion of high-rise units increase.

In the long term, (over 20 year horizon) the District would not be able to accommodate the growth within existing sites. To accommodate a future urban school, opportunities to explore joint development with City facilities as well as other opportunities for creating new space for the district longer-term should be explored.



Map 19 Secondary & Elementary School Catchment Boundaries

8.3

8.4 HEALTH SERVICES

The City Centre Plan accommodates a wide range of health services as well as a major hospital, Surrey Memorial Hospital, at the south end of the plan. While there are health and medically related services located in the high density node areas of the plan, there is a higher concentration of these types of services in close proximity to the hospital. To the north of the hospital, there is a focus on health-related offices and health innovation research and business related uses. To the south of the hospital, there is a continuum of addictions, and mental health services.

Hospital Facilities

Surrey Memorial Hospital

Surrey Memorial Hospital (SMH) began operations in 1959 and today is second largest hospital in British Columbia. In 2011, construction began on a new eight-storey Critical Care Tower to expand SMH with the addition of 430,000 square feet. The expansion increased the number of acute care beds by 30% to 650 and included a new emergency department almost five times the size of the previous ER. In addition, the new facility provided 48 private neonatal rooms, 25 Intensive Care beds, 25 High Acuity Unit beds, 2 dedicated medical floors, an expanded laboratory, rooftop helipad, and additional space for SMH's clinical academic campus.

Jim Pattison Outpatient Facility

In 2011, a new Outpatient Centre was completed just at the eastern edge of the Surrey City Centre plan area. The facility offers day surgery, diagnostic procedures such as lab, X-ray, CT and MRI scans, and biopsies, and specialized health programs for patients that do not require an overnight stay in the hospital.

Other Health Facilities

Other health facilities in the plan area include facilities that provide services for people with physical or mental impairments as well as mental health, addictions and other needs. Facilities in close proximity to the hospital include:

Laurel Place

This facility provides Complex Care, Convalescent Care, Specialized Dementia Care, Bariatric Care and Palliative Care. Through a partnership with Surrey Memorial Hospital, the facility also includes a Hospice and Rehabilitation Unit.

The Specialized Rehabilitation Unit offers a bridge from acute care to outpatient services by providing inpatient rehabilitation to adults with new physical and/or mental impairments (leg amputation, stroke, brain injury).

Kinsmen Lodge

Kinsmen lodge is a complex care home for low income seniors requiring long term nursing care. It is owned and operated by the Whalley & District Senior Citizens Society. This facility provides 157 publically subsidized residential care beds and one respite care bed for seniors.

Phoenix Centre

In 2007, the Phoenix Centre opened. This facility provides 28 short-term addiction recovery beds and 36 transitional housing units.

Creekside Withdrawal Management Centre

This is an addiction and health clinic, offers a 24-hour medically supervised environment for detox. It includes counselling and assistance to find temporary housing.

Quibble Creek Health Centre

This facility offers a 25-mat sobering centre that provides a maximum 23 hour stay for people to safely sober up. Fraser Health also operates a clinic on-site that offers outpatient counselling, referrals, treatment and prevention services, Phoenix Society offers 15 short-term access to recovery rooms, and 52 supported transitional housing units are included as part of this development.

North Surrey Health Centre

The North Surrey health Centre is a low-barrier clinic funded by Fraser Health and operated by Lookout Society. It offers general health services, addictions referrals, counselling for mental health issues low-cost dental services, and supports for people who are HIV positive.

Surrey Memorial Hospital

Jim Pattison Outpatient Facility

Child Care Playground at City Hall

8.5 OTHER SERVICES

Non-profit Community Services

As with other kinds of services, a downtown is also an appropriate location for non-profit community services due to its transit accessibility, and proximity to other amenities. The range of services can include settlement services, employment services, support services for people with mental health and addictions issues, and services for families, women, children and youth. In the City Centre, and other areas of Surrey, these services are permitted in commercial zones.

Child Care Facilities

There are currently two non-profit child care centres in City Centre, one at City Hall, run by the YMCA, and the other at Surrey Memorial Hospital, run by Fraser Health. In additional there many are private child cares that are located in single family areas of the plan.

Child cares are permitted in commercial zones, as well as single family homes. These uses are encouraged in mixed use developments.

SECTION 9
Housing

9
HOUSING

To support a vibrant and robust downtown for all residents, the City Centre Plan provides a wide range of densities which can accommodate diverse unit types and tenures.

The following section outlines land use related policies and guidelines related to housing stock diversity, as well as an inventory of existing rental and social housing in the City Centre.

9.1 OVERVIEW

The City Centre Plan provides a wide range of densities which can accommodate diverse unit types and tenures.

The land use plan provides a range of densities and specific policies that encourage a wide range of unit types such as single family houses and larger ground-oriented units, as well as smaller micro-suites and lock-off suites. Affordability strategies are also identified in the plan through ensuring supply of single family stock that permits secondary suites and coach houses, subdivision into small lots where appropriate, and reduced parking requirements in areas close to transit.

The goal of the City Centre Land Use Plan is to also enable land use conditions that allow flexibility for developers to incorporate non-market rental and social housing through partnerships with government and other agencies. The Mixed-Use designation in the Land Use Plan allows for this kind of comprehensive development. Under this designation, developers can accommodate a combination of residential, commercial and institutional uses on a single site.

More detailed and specific strategies for facilitating affordable and supportive housing are identified in Surrey's Affordable Housing Strategy. The following section outlines land use related policies and guidelines related to housing stock diversity, as well as an inventory of existing rental and social housing in the City Centre.

9.2 DIVERSITY OF HOUSING TYPE

A range of residential unit types is desired for the City Centre. While it is expected that urban centres, are home to greater concentrations of smaller households, including couple households, singles, and other non-family households, it is important that a diversity of unit types be encouraged to accommodate a variety of household types and residents at varying stages of life.

The City Centre Plan aims to facilitate the construction of many unit sizes and types, including larger units for families and smaller (typically more affordable) units for singles, students, and seniors. The Land Use Concept sets out a wide range of density designations that allow for a wide diversity of housing stock. Higher density areas are located in close proximity to skytrain stations and allow for high-rise and mid-rise residential tower forms of development. The medium density designation facilitates townhouses and apartment buildings. The low density designation allows for single family homes with secondary suites, coach houses, and duplexes. Together, these forms of housing allow for larger unit types, as well as small units types.

Family Oriented Housing

The City Centre Plan encourages family-oriented unit types throughout the plan area to support families living within, and close to the downtown. These building forms tend to be ground-oriented and/or larger in size. They include single family houses, as well as townhouses, and 2 to 3 bedroom units in high rise buildings.

Single Family

Two single family areas have been identified in the plan: one area in the north-east and the other at the south west. The single family/duplex designation has been established to retain the single family housing form within the downtown. To continue to allow gentle densification however, the single family designation areas will allow gentle infill redevelopment into ground-oriented housing. This includes subdivision of larger lots to allow small-lot single family homes and/or duplexes and in some cases low density townhouses. (see Section 4.3).

Multi-Family

Design policies have also been established to encourage the provision of townhouses within high density multi-family developments. These include design requirements for areas with a 7.5 and 5.5 FAR designation to construct townhouses at the ground level of high rise towers. (see Section 4.3). In the 2.5 FAR designations, townhouse form of development is encouraged at the perimeter of the plan area in order to provide a suitable transition building type across from existing single-family houses along the periphery of the plan.

In addition to single family houses and townhouses, larger family-oriented condominium units can also form part of the family-oriented housing mix. Currently studio and one bedroom units make up the largest component of units type built in City Centre. Four of every five dwellings are studio and one- or two-bedroom units. To encourage the construction of two or three-bedroom units, a policy incentive has been incorporated into the amenity fee structure. The amenity charge for units with two bedroom or more will have a lower per-square foot charge compared to one bedroom or studio units (see Section 12.3).

Smaller Unit Types

Micro-Units

Micro-units are a newer type of smaller housing unit in Surrey which may provide affordable housing options for single households, such as for working professionals and students. In Surrey City Centre these units are smaller than the typical studio unit size.

Incorporating these smaller units into the plan will encourage the development of affordable units in close proximity to transit, open green space, commercial, and community and recreational facilities. The plan provides design direction to ensure the units are livable (see Micro-unit Design Guidelines Section of the Design Guidelines), as well as locational criteria in the Development Policies in Section 11 of the plan.

Lock-Off Suites

Secondary suites within apartments are referred to as “lock-off suites”. These unit types offer another option for smaller suites that can be enable condominium owners to rent out or have flexible extra space in their homes. These suites can allow the larger unit to adapt change over time according to the needs of the unit owner. For example, the lock off suite can also be used as an extra bedroom for family, a student, an in-law suite, or a unit for a care-giver or nanny.

9.3 DIVERSITY OF HOUSING TENURE

Along with diversity of housing type, diversity of housing tenure is also an integral component of the housing strategy for City Centre. The inclusion of market and non-market rental and social housing supports a vibrant and robust downtown in the City Centre. This tenure provides housing options for diverse populations with different income levels and households types, including families, couples, singles, seniors and vulnerable populations. The following section outlines the existing market rental, non-market rental and social housing stock on City Centre.

Existing Market Rental Housing

Rentals make up a significant proportion of the housing stock in City Centre where approximately half of all (private) households rent. There are four components of market rental housing in City Centre: purpose built rental apartments, condominium rentals, private house rentals and secondary suites in single family houses.

Purpose built rental apartments comprise a relatively small share (23%) of the rental housing stock in City Centre. The current inventory amounts to 1,437 units which represents a sizable share (roughly one-quarter) of all purpose built rental units in Surrey. The largest segment of market rental housing in City Centre is comprised of condominium rentals. Of the 8,289 condominium units in City Centre, 3,557 units or 43% are not occupied by the owners as a primary residence. While some of these units may be secondary residences or vacant, it is presumed that the vast majority are rented or available to be rented. It is believed that rentals make up a much higher proportion of condominium apartments in City Centre compared to the rest of Surrey. (As a comparison, the Canada Mortgage and Housing Corporation estimated that 24.2% of condominiums in the Fraser Valley, which includes Surrey, were rented in October 2015.)

House rentals including single family houses, duplexes and manufactured homes make up a much smaller component of the rental housing stock in City Centre. However, it is believed that houses are much more likely to be rented in City Centre compared to the rest of Surrey. Many of these properties are located in areas that are expected to redevelop at higher densities and it is likely that rental housing is an interim use. Of the 1,667 single family houses, duplexes and manufactured homes currently in City Centre, 623 or 37% are not occupied by the owners as a primary residence and are presumed to be rented.

The final component of market rental in City Centre is the rental of secondary suites in single family houses. There are an estimated 536 secondary suites, accounting for only 9% of rental units. Secondary suites comprise a relatively small portion of rental housing in City Centre largely due to the overall mix of housing types which skews towards apartments. This contrasts with Surrey overall where secondary suites are believed to be the dominant form of rental housing.

Map 19 shows the distribution, relative proportion and type of rental units currently in the City Centre.

Map 20 Rental Housing Locations 2016

9.3

Existing Non-Market and Social Housing

Non-market rental and social housing also form part of the housing mix in City Centre. This includes housing for people with disabilities, seniors, and vulnerable populations. This form of housing may be stand-alone buildings, or form part of a mixed use development in a high density building that is close to amenities, services and transit.

The City Centre has non-market rental and social housing ranging from seniors facilities, housing to support people at risk of being homeless. Continued partnerships with other levels of government will help facilitate construction of other projects. Examples of these existing housing projects in City Centre include:

Transition & Supportive Housing

- Phoenix Centre
- Quibble Creek
- Phoenix Rising Sun Villas
- Timbergrove Apartments

Aboriginal Supportive Housing

- Ama-Huuwilp
- Kechi-o-wekowin

Non-profit and Co-op Housing

- Kinsmen Ravine Estate
- Chelsea Place
- Jessica Place
- Sutton Place
- The Gateway
- Ted Kuhn Towers 1 & 2
- Mayflower Co-op
- Sunshine Housing Co-op

Phoenix Centre

Timbergrove Apartments

Rising Sun Villas

9.4 FUTURE DIRECTION

A comprehensive and detailed strategy is needed to fully explore the role of policies related to creating new rental and affordable housing in City Centre and city-wide. This includes protection of existing rental stock, construction of new stock near transit areas, and housing for special populations.

Protecting Rental Stock

Protecting the existing rental stock is a key consideration city-wide. Over the past few years there has been an increasing demand for rental housing in the City Centre as well as the Lower Mainland in general; vacancy rates for rental housing have been decreasing and the rents have been increasing. Currently, Surrey's Strata Conversion Policy is in place to protect the existing rental stock, and this policy is applicable to any redevelopment of rental housing stock in City Centre. However, there are no existing city policies to protect purpose-built market rental housing.

The multi-government and partnership nature of providing non-market and social housing will require a comprehensive and detailed city-wide strategy to fully explore the role of the city and the future policies related to creating new rental and affordable housing. To address issues related to rental as well as affordable housing stock, the City has initiated an Affordable Housing Strategy. The strategy will include an examination protecting and facilitating construction of new affordable rental housing stock and related policies.

Rental Housing Near Transit

The Affordable Housing strategy process will also consider strategies to facilitate and support the construction of rental housing stock within close proximity to transit-oriented areas, and in particular affordable housing near frequent transit areas. According to MetroVancouver's Regional Affordable Housing Strategy, renters are more likely to take transit to work than owners, and renter households earning less than $50,000 per year depend on transit the most.

Student Housing

The City Centre contains a large post-secondary institutional presence, and future expansions underway will grow the student presence in the downtown. Provision of housing specifically for the student population will also need to be a consideration.

PART C

Implementation

SECTION 10
Urban Design Guidelines

10
URBAN DESIGN GUIDELINES

Urban design guidelines play in integral role to help transform the suburban City Centre landscape to one that is more urban.

The design guidelines have been organized into seven sections:

- Skyline
- Building Heights
- Block Structure & Connectivity
- Commercial & Non-residential
- Historic District Commercial
- Residential
- Plazas and Open Space

10.1
DESIGN OBJECTIVES

This copy is a topic statement about the sub-section.

These guidelines will shape public and private sector development including buildings, streets, plazas and gathering spaces, into an environment that is vibrant, pedestrian-friendly and highly attractive to support investment and activity in the City Centre.

The following design objectives will help to support the larger City Centre vision:

Establish an identifiable downtown skyline

Integrate high density with walkability and transit orientation

Create a high quality, attractive architectural built form

Establish an image of a green City Centre

Provide a high quality, vibrant public realm

Use west coast contemporary lines & natural materials

Foster unique identity in character areas

10.2 SKYLINE

Skyline views of the cities can be the most memorable and defining the images of a city.

The urban design guidelines provide principles and guidelines to help shape the skyline and to influence the image of Surrey. Surrey City Centre's skyline is at the very early stages of its skyline formation. Through the build-out process, the City Centre skyline will become more defined.

Several factors influence how a city's skyline is formed. Many cities have a unique setting which creates opportunity for the city form, some cities' natural context helps define their unique image. For example, Hong Kong, Anchorage and Portland have notable settings with mountains as a backdrop. Other cities, such as Chicago or Halifax are set at the edge of a water body.

Where the natural landscape is not necessarily prominent, cities may have distinctive building forms which focus the view. Examples include Toronto, Calgary and Seattle, each having a distinctive shaped needle as part of their skyline.

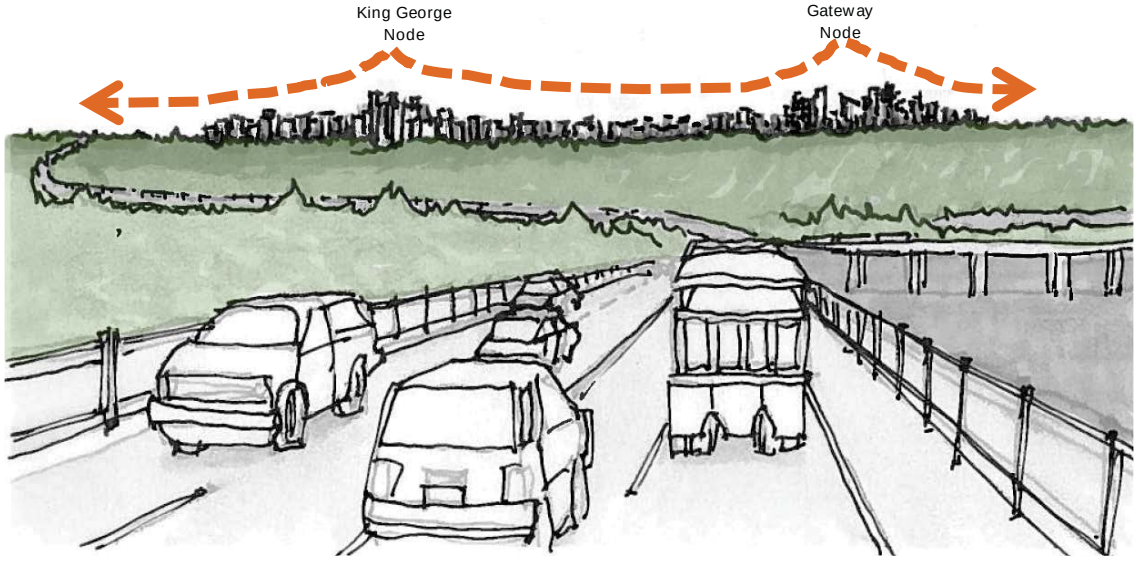
The shape of the city's skyline can also reinforce or create a unique context. Different examples of skyline shapes include a flat top with blunt edges, or a jagged line, or a tapered dome.

Integrate Local Context for a Unique Skyline

A unique feature of the City Centre is that sits on a topographic knoll. This location allows the City Centre skyline to be visible from surrounding areas of New Westminster, Coquitlam, Richmond, and southeast Surrey. Its back drop is also set against mountains to the north. Given this topography, a traditional tapered form suits the views of the City Centre.

Guideline: Punctuate the tapered form with higher nodes to emphasize important locations in the City Centre area (King George node and 108 node) and add interest to the skyline

Guideline: Use high landmark tower forms to help create a reference point and hierarchy of forms on the skyline.



10.3 BUILDING HEIGHT CONCEPT

The Building Heights concept will help support the skyline vision for City Centre.

The Building Height Concept supports the skyline vision through clustering the tallest buildings in City Centre around each of the three SkyTrain Stations, with the greatest concentration of tall buildings in the vicinity of the Surrey Central and King George SkyTrain Stations. As build-out occurs, the Surrey Central and King George Stations will read as one node on the skyline. This concept will result in an attractive and memorable skyline with two peaks linked by valleys of lower buildings **Map 20** shows the Building Heights Concept Map

Emphasize Nodes with Height

The main roads leading into City Centre (KGB from south and north, 104 from east and west) should make the city form more legible by allowing views of the nodes from these approaches. Lower buildings at the periphery of the plan area will emphasize the importance of the highest node at King George Station.

Guideline: Locate taller buildings and landmark building forms in locations which emphasize the importance of the nodes. Building heights may range from 30 to 38 stories in the nodes. Increased heights may be considered for landmark towers.

Guideline: Lower buildings (4 to 6 stories) should be located on the outer edges of the plan, stepping up the height to higher buildings toward the middle nodal areas of the plan area.

Consider Topography in Relation to Building Heights

The topographic high point of City Centre is located in the north east from 105A to 108th Avenues and 136th to 140th Streets. The topography rises 25m from King George Boulevard up to 140th Street which increases the effective height of buildings and it increases the visibility of this area from surrounding areas. This is a future multiple residential neighbourhood centred around Forsyth Park and buildings should be at a scale that addresses the additional topographic height.

Guideline: In higher elevation areas, such as the Forsyth neighbourhood, building height should be a maximum of 12-18 metres high (4-6 storeys).

Guideline: Along the hillside, such as Peterson Hill, building heights should be a maximum of 12-18 metres (4-6 storeys), to maximize view corridor towards the Gateway Node

Provide Appropriate Transition to Single Family

Guideline: In single family interface locations, building height should transition down to a maximum of 12 metres height (4 storeys).

Maximize Views

Views from the northern geographic knoll are spectacular. These views are of the mountains to the north, the Fraser River to the north east and north west, Georgia Straight and Vancouver Island to the west, the Gulf Islands to the south west and south, and Mt. Baker to the southeast.

Guideline: To maximize the private views from towers, buildings should taper down in height from the centre to the periphery and should step down on hills (i.e. north of 108th).

Guideline: Emphasize views towards the key nodes by tapering building heights at the edges. For the Gateway node, provide lower building heights coming up Peterson Hill along King George Boulevard, so that views into the Gateway Node are unobstructed.

Map 21 Building Heights Concept

10.3

10.4 BLOCK STRUCTURE & CONNECTIVITY

A finer-grained block structure provides a pedestrian oriented framework, which is critical to creating a vibrant downtown.

The land use plan shows the minimum street and lane network that will be required. However to achieve a block size that promotes high connectivity, additional streets, green lanes and pathway connections through sites may be required at time of development. The ideal block size will vary depending on the form of development and site size. High pedestrian penetrability will be required in areas with densities over 2.5 FAR.

Smaller Block Sizes to Promote Walkability

Guideline: A block length should be no longer than 80 to 100 metres before a connection is provided

Guideline: Use streets, green lanes, and walkways to achieve walking connections and smaller block size.

Achieve Connectivity in Established Neighbourhoods

Where parcel consolidation is less predictable, such as in established neighbourhoods that have very long term redevelopment horizons, achieving ideal grid road connections can be challenging. In these cases, establishing higher number of off-set green lane connections may be preferred, compared to achieving fewer and more uncertain roads connections that are ideally aligned.

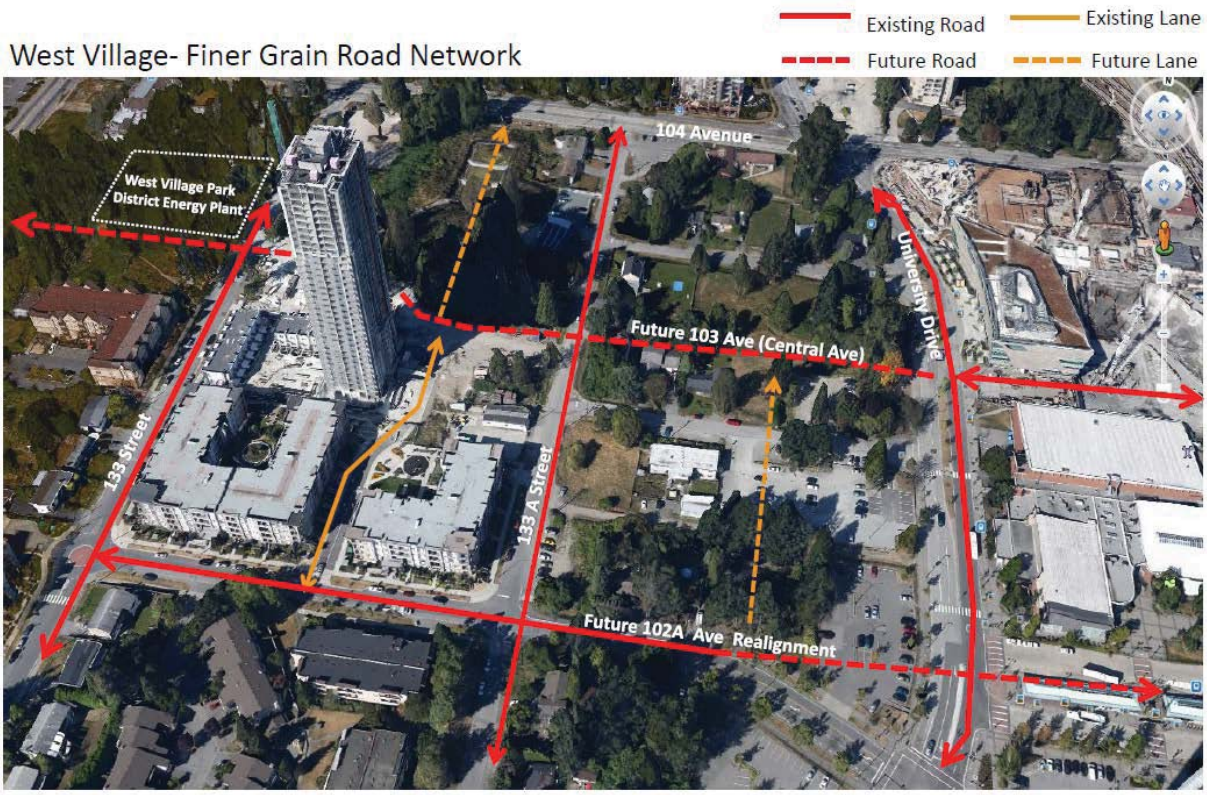
Guideline: In medium density neighbourhoods, such as the Forsyth, off-set lanes and higher lane density will form part of the neighbourhood character.

Pedestrian links should have a high degree of defensibility

Guideline: Pedestrian paths should be wide enough to allow two disabled persons with wheelchairs, scooters, or walkers to pass.

Guideline: Units should be designed to provide natural surveillance of pathways connections through sites

West Village- Finer Grain Road Network



10.4

10.5 COMMERCIAL AND NON-RESIDENTIAL

Ground Floor/Street Interface in Highly Active Areas

Successful commercial streets are vibrant and provide interest for the pedestrian. Key factors that provide a vibrant ground floor interface environments. In areas identified as "highly active" (see **Map 21** in Section 11.2 Development Policies), the following apply.

Façade Rhythm Creates a Vibrant Pedestrian Experience

Thriving streets all over the world often have narrower façade lengths that create visual interest for the pedestrian and makes walking distances seem shorter. In contrast, facades designed with horizontal lines and few doors make distances seem longer and signal the pedestrian to keep moving on, rather than stopping.

Guideline: Provide narrow storefront widths to establish a pedestrian scale and rhythm and to add texture and visual stimuli

Guideline: Differentiate storefronts through change of materials and façade treatment

Guideline: Create visual interest with vertical articulation.

Open Façade Edges Increase Pedestrian Activity

Where the street facades are open and transparent, with large windows and many openings and entrances, pedestrians tend to slow down and stop more frequently, than long sections of blank facades or dark glass. Studies also show that there is seven times more pedestrian activity in front of open facades.

Guideline: Maximize windows to retail shops to encourage easy viewing of goods.

Guideline: Avoid columned arcades that reduce visibility into the store.

Guideline: Set floor levels at the sidewalk grade and step with grade on sloped sites.

Guideline: Avoid security, bars on windows and bollards at storefront. Consider the use roll away security gates, or use of landscaping such as planter pots to provide security while maintaining a positive visual image.

Weather Protection Increases Pedestrian Comfort

Guideline: Provide continuous weather protection with canopies

Guideline: Use canopy materials and finishes related to the building such as glass and metal.

Guideline: Consider translucent canopy materials that allow light onto the sidewalk below and create a brighter image on the street.

Guideline: Locate canopies a minimum of 3m above the sidewalk level.

Guideline: Ensure canopies are deep enough to provide rain shelter. A minimum depth of 1.5m is recommended.

Rendering Showing Active Retail Interface Condition

Street Enclosure Defines the Street

Streets should have a strong street enclosure oriented to line the streets, particularly curved streets and the edges of open spaces. For open spaces such as plazas and parks, the buildings can define the edge or "urban room" with a strong building form surrounding these spaces.

Guideline: Towers should be set close to the street to reinforce street definition and enclosure with a maximum 4m setback from the podium face

Guideline: For wider streets such as King George Boulevard, south of 104 Avenue and on 104 Avenue, east of King George Boulevard, where the street is widened for the benefit of future rapid transit, a higher street enclosure of 6-8 storeys is encouraged to create a better proportion of enclosure.

Guideline: On the south side of east-west streets, the street enclosure should be interrupted for openings or setbacks in the upper podium of buildings to allow sunlight access to the street and north sidewalk in the winter months.

Ground-Floor Activity Creates an Interesting Streetscape

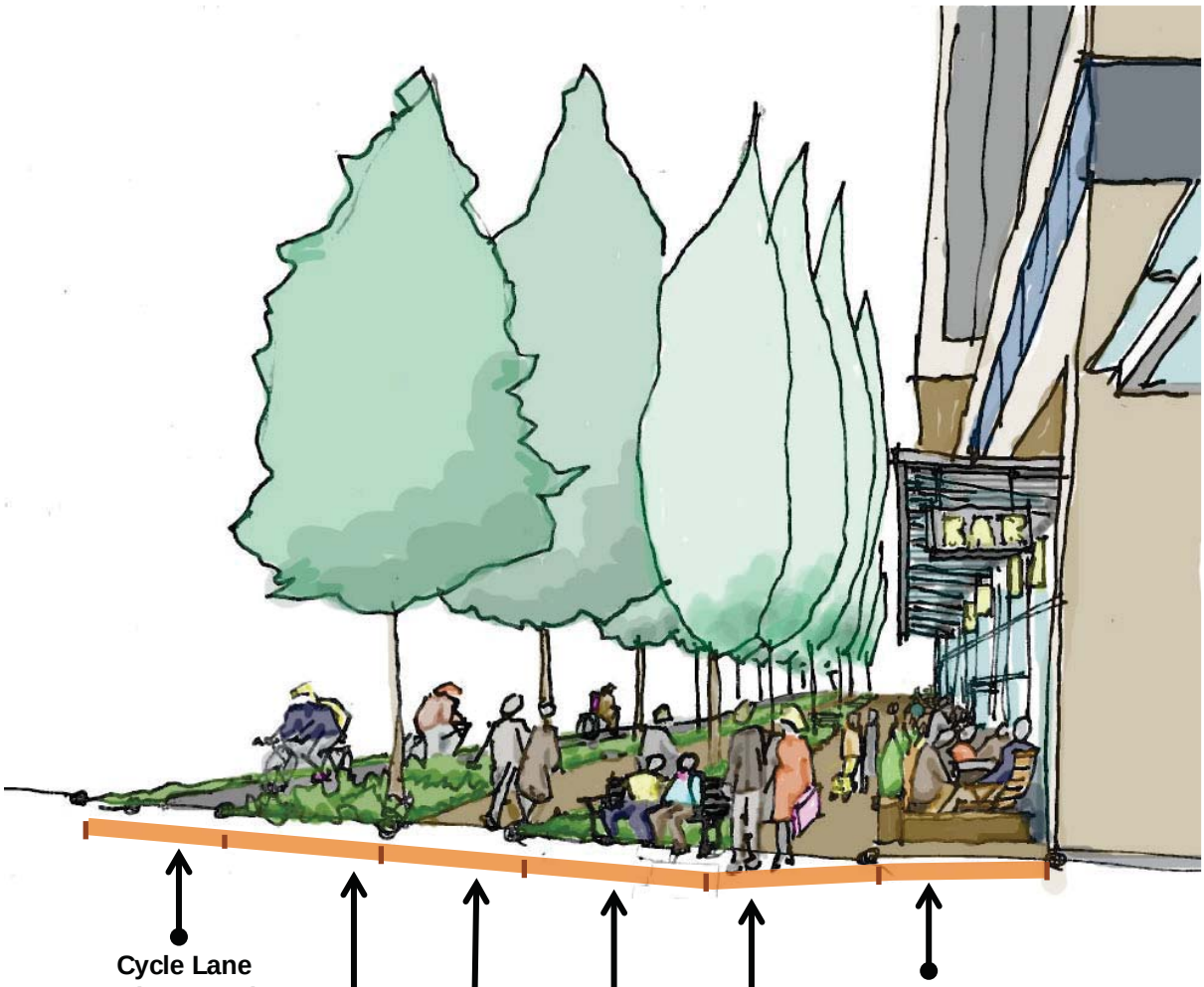
Guideline: Create a "Merchant Zone" where a setback of 4 to 8 or more metres is possible. Provide an inside row of trees on private property where there is a setback of 3m or more to reinforce the formal tree lined promenade along the streets.

Guideline: Provide space for outdoor cafes, seating, product display, and bicycle parking at the storefront where appropriate.

Guideline: Provide amenities such as benches, garbage cans, bike racks, and public art along the streetscape where possible.

Guideline: Relocate non active uses such as exit stairs and service spaces to maximize active frontages.

Commercial & Non-Residential- Streetscape Components



Cycle Lane Above Curb

Outside Row Trees & Planting

Outside Row Sidewalk

Merchant Zone includes outdoor cafés, product display such as produce, flowers etc.

Inside Row Walkway

Amenity Zone includes benches, bike racks, garbage receptacles, in-ground planting, and inside row trees

10.5

Non Residential Building Form & Character

Integrate Towers along the Streetscape

Guideline: Use a continuous podium to create continuity along the streetscape and integrate other building forms.

Guideline: Use a podium to provide a strong base that balances the tower form.

Guideline: Create a strong podium of 4-6 storeys for tower developments.

Form the Top of Towers into the Roof Expression

Guideline: Roofs of lower buildings should be greened and treated to address overlook from higher buildings.

Guideline: Include functionality into roof such as roof gardens where appropriate.

Incorporate Sustainable Building Practices

Guideline: Use shading devices to minimize unwanted solar gains during summer months. Vertical fins may be considered on west facades and horizontal louvers on south, east and west facing windows.

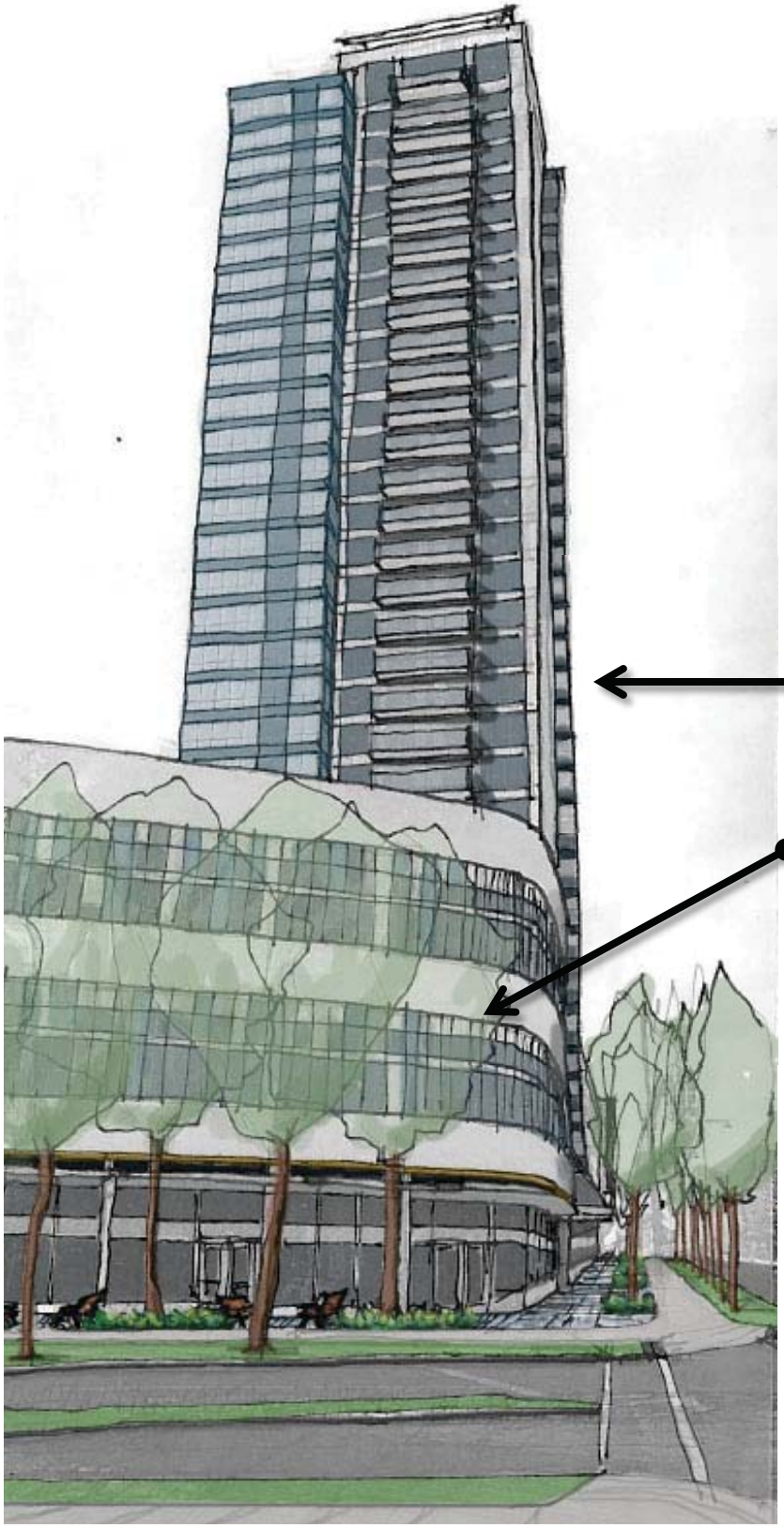
Guideline: Mitigate thermal bridging impacts by minimizing window frame connections, and place windows in line with insulation layer.

Guideline: Maximize potential for natural ventilation, and reducing the need for mechanical ventilation

Guideline: Include materials that help with reducing heat absorption, such as using materials that reflect light away from the building, or green roofs to absorb heat

Guideline: Optimize fenestration on south and west-facing facades. While ground floors may have floor to ceiling windows, consider oversized windows on upper floors; a 50% glazing ratio may be considered

Guideline: Consider using shading devices to minimize solar gains during summer months such as planting deciduous trees along west and south facades


Tower Development
Continuous Podium
to Create Continuity
and Balance Tower Form

10.6

10.6 HISTORIC DISTRICT COMMERCIAL

Ground Floor/Street Interface

Storefront widths in the Historic District average about 7 to 8 metres. Retaining the historic widths for existing sites and infilling with narrow storefront widths will provide a visually interesting and successful commercial environment that reinforces the historic character..

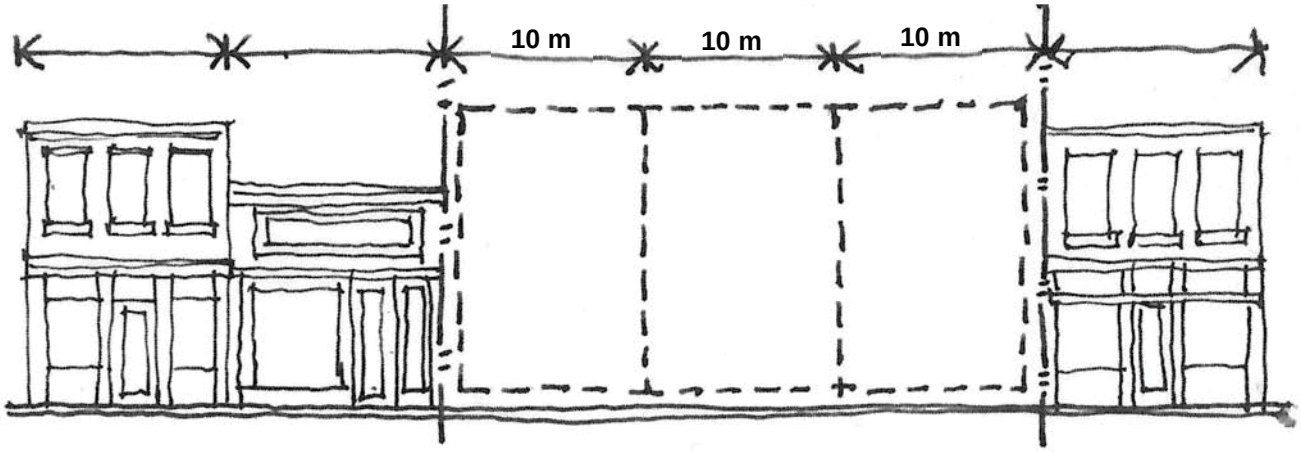
Reinforce Historic Storefront Widths

Guideline: In the Historic District, the maximum individual storefront width should be no wider than 10 metres.

Guideline: The design of the facade of a new building should be divided into vertical units of width within the range typical of heritage buildings in the historic district.

Guideline: Avoid consolidation of two (or more) shopfronts into one, since it reduces pedestrian interest. If such a consolidation is proposed, the retention of original historic building features should not be compromised, even if it this means retaining a redundant entry configuration.

Guideline: At-grade large retail tenants should either be set behind smaller tenants with a smaller entrance at ground level or located on the 2nd floor with smaller retail at grade.



Building Form & Character

Influenced by the Mid-Century Modern design aesthetic, the use of clean contemporary lines influenced by 1950's, natural materials is encouraged in the Historic District..

Use Simple Clean lines to Express the Mid-Century Design Aesthetic

Guideline: Use simple geometric lines

Guideline: Reduce ornamentation on building façade

Guideline: Emphasize horizontal and vertical planes

Guideline: Use flat roofs or roof lines that are prominent and distinct, yet understated

Guideline: Use boldly cantilevered forms in the canopy.

Guideline: Express canopies with dynamic shapes, such as angles, wedges, and butterfly roofs.

Allow Natural Light to Flow from Outside to Inside

Guideline: Allow building design to create transparency between the outside realm and the inside realm

Guideline: Consider open floor plans and floor to ceiling windows.

.

Natural Building Materials Reinforce a Clean Simple Design Aesthetic

Guidelines: Use natural materials such as brick, stone, and wood.

Guideline: Combine natural materials with concrete, steel, and glass to create a complete façade. Common façade materials of mid-century modern period are:

Guideline: Apply stone elements as accents only, adding aesthetical value. Natural stone cut into long, thin pieces and applied in distinct patterns to building facades is representative of mid-century modern style.

Use Concrete as a Finishing Material

During the 1950s, concrete was used to frame windows and doors and often is shaped in unique ways. For example, arches and columns were addressed with concrete to add simplicity to the structure. Cantilevered areas would be clad with concrete.

Guideline: Use of high quality architectural concrete is encouraged as the primary building finish or accent.

Guideline: Concrete patterned blocks may be used to create an interesting screen or building feature.

Incorporate Mid-Century Modern Colour Palette

Guideline: Use a muted color palette in natural earth-tones on building facades. Examples of common muted colour palettes used in the mid 1950's include: yellow, gray, blue and green

Historic Signage

Reinforce Heritage Character Through Sign Preservation

Two signs from the mid-century period have survived in the Downtown Historic District, the Round up Café and the Rickshaw signs. Preservation of these signs creates a memorable image, a sense of longevity and permanence for the business, while reinforcing the historic character

Guideline: Where possible preserve and restore historic signs. Reuse of these signs for new business is recommended.

Integrate Existing Heritage Signs into Redevelopment

If re-use of the sign is not possible, new developments should integrate the heritage sign into the redevelopment through an adaptive re-use approach.

Guideline: If original sign is not part of redevelopment, then adaptive re-use of neon signage encouraged.

Guideline: Consider adaptive reuse of a heritage sign for purposes other than signage. For example a heritage sign could be used as a public art feature on private or public property

Incorporate Historic Design Elements in a Contemporary Way for New Signage

Mid-century signs were often the focal point of a building. Fins, flag poles, and elaborate shapes were used to call attention to the business advertised. Neon lights and groupings of small individual light bulbs where used to trace lettering, logos and images.

Guideline: Use 50's mid- century modern influence through the use of clean contemporary lines,

Guideline: Use of simple, stylized channel lettering encouraged

Guideline: Internally illuminated, plastic-faced box signs are not recommended.

Guideline: Indirect light sources on signs or letters individually lit with neon or small decorative light bulbs are historically appropriate.

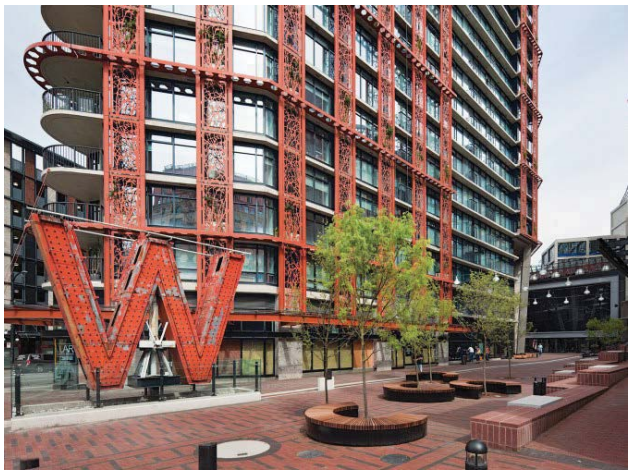
Guideline: LED lit signs emulating historical neon signage is encouraged

Guideline: Canopy signs will not be permitted. Signs of this type were seldom used in the mid-century period because of the relatively low canopies common at that time; instead projecting signs were typically placed above suspended canopies.

Guideline: Projecting signs are supported**.** Signs of this type are mounted perpendicularly to the building face and were used in mid-century periods. Projecting signs are desirable because they work well with canopies and tend not to obscure architectural details.

Guideline: Building face mounted signs with solid metal lettering backlit by lamps or incandescent neon bulbs tracing the letter shapes will be supported.

Examples of contemporary adaptive re-use of heritage signs are shown on the next page.



Woodward's Department Store "W" Sign
Serves as Public Art at Street Level
(Vancouver)

Eamon's Bungalow Camp Sign
Re-adapted as Transit Shelter
(Calgary)

Ridge Theatre Sign
Re-purposed as Public Art as Part of
Arbutus Ridge Residential Redevelopment
(Vancouver)

10.7 RESIDENTIAL

A lively city needs to have high density in residential areas, to achieve a certain critical mass. But to be successful, this density needs to be combined with livability, high quality design and good edge conditions between public and private space. This section describes components for creating lively urban residential neighbourhoods through guidelines for the ground floor street interface, site design, and building form and character in residential areas.

Residential Ground Floor/Street Interface

People's interest should be engaged with primary living spaces at the ground level. This interaction between the building ground plane uses and the public realm creates a positive urban experience.

Scale the Ground Floor for Pedestrians

The pedestrian experiences the ground-floor more directly, than stories above. These interfaces should be designed for the pedestrian scale.

Guideline: A two to three storey expression of townhouses at the base of the building should be provided to engage and create the street life in residential neighbourhoods.

Guideline: Townhouse floor levels should step with the sidewalk grade min 0.5m max 1.5m.

Guideline: Principle building face of the townhouse should be setback a minimum of 4.5m from the edge of the sidewalk.

Create a Friendly Edge to Create Activity and Pedestrian Comfort

Semi-private outdoor space immediately in front of ground floor residences creates a " soft edge" condition, which plays an important role in the level of life on residential streets. These can be created by landscaping, a porch area, and interesting design features.

Guideline: Each individual entrance should be enriched with landscaping, a tree and art features. Soft edges create opportunity for more pedestrian activity and interaction.

Guideline: Distinctive character elements, which express the individual neighbourhood, should be incorporated. Railings should have specialty materials, colour and detailing.

Guideline: Non-active uses such as amenity rooms, dens and service spaces should be relocated away from the street interface.

Guideline: Expand the public realm sidewalk and inner boulevard by setting back the fencing for residential patios 1 m beyond the sidewalk.

Guideline: A separate entry porch to each unit should be expressed at the street level with weather protection over each entrance.

Guideline: Front doors and porches should face the street with steps leading straight to the street (not turned).

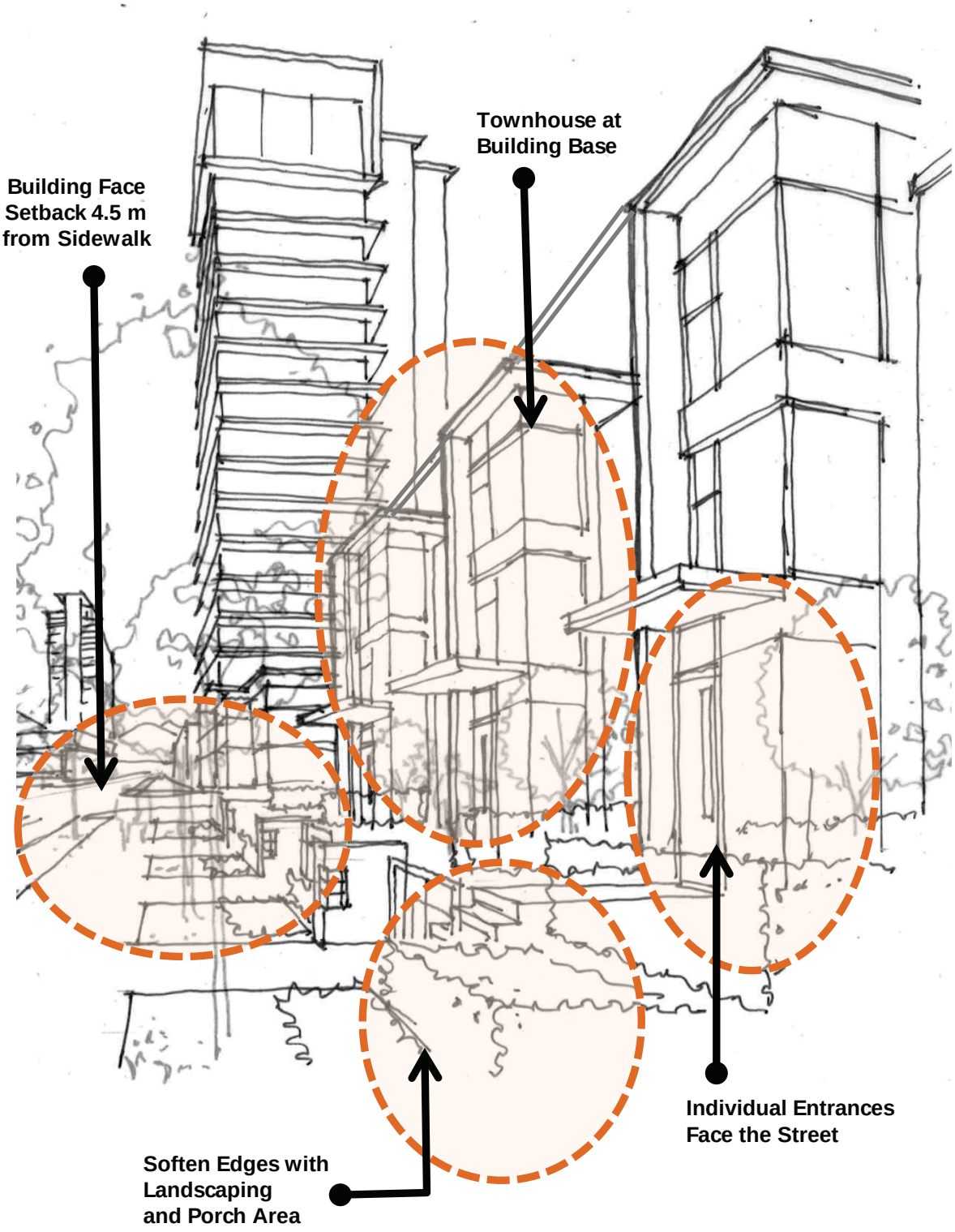
Provide Privacy and Livability in Dense Urban Areas

Guideline: Create a clear definition between public and private spaces.

Guideline: Residential liveability should be provided including privacy separation between units and provision of open space for private and shared use.

Guideline: Semi-private uses such as living, dining rooms and kitchens should face the street with windows that overlook the street and public areas. Private bedrooms would be located on the 2nd floor.

Guideline: Shared outdoor amenity spaces should incorporate child's play area for a variety of weather conditions and include passive and active programmed spaces including marked areas for sports.


Townhouse at
Building Base
Building Face
Setback 4.5 m
from Sidewalk
Individual Entrances
Face the Street
Soften Edges with
Landscaping
and Porch Area

General Site Design

Create Interest with Off-Grid Building Orientation

Most towers should be oriented square to the street grid to reinforce the street definition. However, too much repetition of tower groupings with the same orientation can appear repetitive, so selective off-grid orientation at some locations will create interest.

Guideline: At some prominent corners, vary building orientation to add interest.

Guideline: Consider off-grid orientation to create a cluster around green open space.

Sketch Showing Interesting Building Form At Focal Point of Axial View

Punctuate the Street-end View with Axial Building Forms

Many of the roads in City Centre curve to connect to other roads both existing roads and future roads. Where the street curves away or ends, this creates an opportunity to punctuate the street end view with a specialty axial building form. The longer the street in front of the street end site, the better appreciation of the form while moving along the street.

Guideline: Axial building forms should emphasize interest rather than height.

Minimize Visual Intrusion of Service Infrastructure on the Public Realm

Service requirements for both on and off-site should be identified early in the development process to minimize visual intrusion on the public realm.

Guideline: Locate and screen services and kiosks out of view from the public realm yard setbacks and provide screening.

Guideline: Set the Hydro kiosk back to the building face and provide screening,

Guideline: Identify the location of the gas meter, and parking mechanical to be located below grade. Any associated vents should be located back from the public realm yard areas

Orient Buildings to Maximize Solar Gains and Reduce Heating Requirements

Guideline: While podiums need to be oriented according to existing street grids and existing buildings, a tower's orientation should be rotated such that the longest façade is within 30 degrees of true south.

Guideline: Buildings should be designed to maximize the length and width ratios of towers to take maximum advantage of potential solar energy.

Residential Tower Form and Character

Form the Top of Towers into the Roof Expression

Guideline: Include functionality into roof such as roof gardens.

Guideline: Minimize height in elevator penthouses and shape to emphasize the architecture of the building.

Guideline: Green and treat roofs of lower buildings to address overlook from higher buildings

Mitigate Pedestrian Level Wind Effects

In the highest density areas, reducing the impacts of wind should be considered. Features that can reduce wind impacts are balconies and articulation on tower forms which capture and slow the wind at the upper levels. A wind analysis may be necessary for towers in the denser areas.

Guideline: Incorporate podium at base of building to reduce wind speed and direction

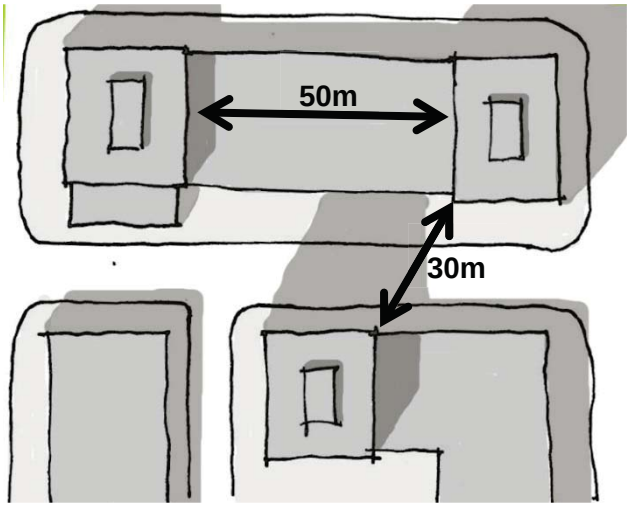
Guideline: Orient widest point tower building face away from prevailing winds

Guideline: Minimize the size of point tower floor plate to minimize effects of down flowing wind

Guideline: Mitigate wind tunneling intensity by using appropriate tower separation distances

Reduce Shadow Impact and Consider Views

Tower forms can be sculpted to reduce shadowing and maximize privacy and views. Towers should be spaced to increase privacy between residential towers, be slim in profile to allow views through and be oriented to minimize shadow impacts.



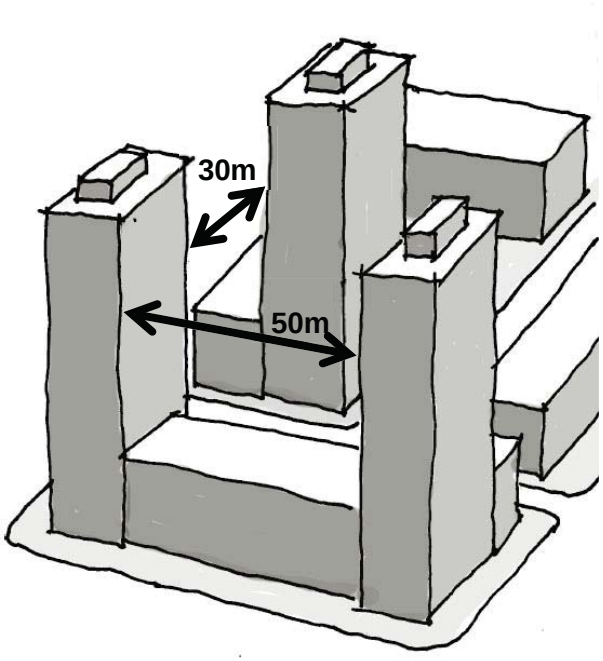
Guideline: Tower separation for residential units should achieve a distance of 30 m on a diagonal or 50m face to face.

Guideline: Create a compact tower shape and orientation to reduce shadow impacts. Consider minimizing the east-west dimension to 28m width and a maximum 600 square metre floor plate size.

Guideline: Locate towers to allow views through from surrounding sites and from within the site for multi-tower sites.

Guideline: Locate towers to minimize shadow impact on parks and plaza space. Show 10 am, noon, and 2 pm at Equinoxes.

Incorporate Sustainable Building Practices



Guideline: Use shading devices to minimize unwanted solar gains during summer months. Vertical fins may be considered on west facades and horizontal louvers on south, east and west facing windows.

Guideline: Mitigate thermal bridging impacts by minimizing window frame connections, and place windows in line with insulation layer.

Guideline: Maximize potential for natural ventilation, and reducing the need for mechanical ventilation

Guideline: Include materials that help with reducing heat absorption, such as using materials that reflect light away from the building, or green roofs to absorb heat

Guideline: Optimize fenestration on south and west-facing facades. While ground floors may have floor to ceiling windows, consider oversized windows on upper floors; a 50% glazing ratio may be considered

Guideline: Consider using shading devices to minimize solar gains during summer months such as planting deciduous trees along west and south facades

Micro-unit Guidelines

Micro-Units are self-contained residential units (with private bathrooms and kitchens) which are between 320 square feet and 375 square feet. To encourage the development of affordable units that are livable, the following guidelines apply:

Locate Units Close to Neighbourhood Amenities

Guideline: Micro-units will only be permitted within 400 metres to the rapid transit stations or large scale educational institutions.

Improve Livability of Small Units

Guideline: Provide outdoor space, either in the form of private or shared space.

Guideline: Ensure 4 square metres of outdoor amenity space for each micro-unit is provided. If physical limitations impact the quality of the outdoor space, less may be required

Guideline: Provide usable private outdoor space for each micro dwelling unit in the form of balconies, decks or patios.

Guideline: Provide amenity space that is accessible to all tenants throughout the building. This includes indoor spaces such as lounge space, common meeting rooms and outdoor spaces such as courtyards and common roof decks.

Guideline: Ensure 4 square metres of indoor amenity space for each micro-unit is provided. If physical limitations impact the quality of the outdoor space, less may be required.

Design for Comfort and Occupant Well-Being

Guideline: Maximize exposure to daylight, ventilation and fresh air. Consider horizontal angle of daylight.

Guideline: Consider opportunities for higher ceilings (minimum of 9'6") and reflective light shelves that allow light further into the unit.

Maximize Layout and Storage Options

Guideline: Include in-suite storage

Guideline: Consider custom built- in, for example fold up beds, and shallow cupboards

Residential Mid-Rise and Low Rise Form & Character

Create an Urban, Pedestrian Oriented Image

Guideline: Provide a distinctly urban character with flat or low slope roofs

Guideline: Build a two or three level podium to create pedestrian interest

Guideline: Visually scale down buildings to a length of 60m (200') with a significant articulation of both roof and change of building cladding material to accomplish articulation.

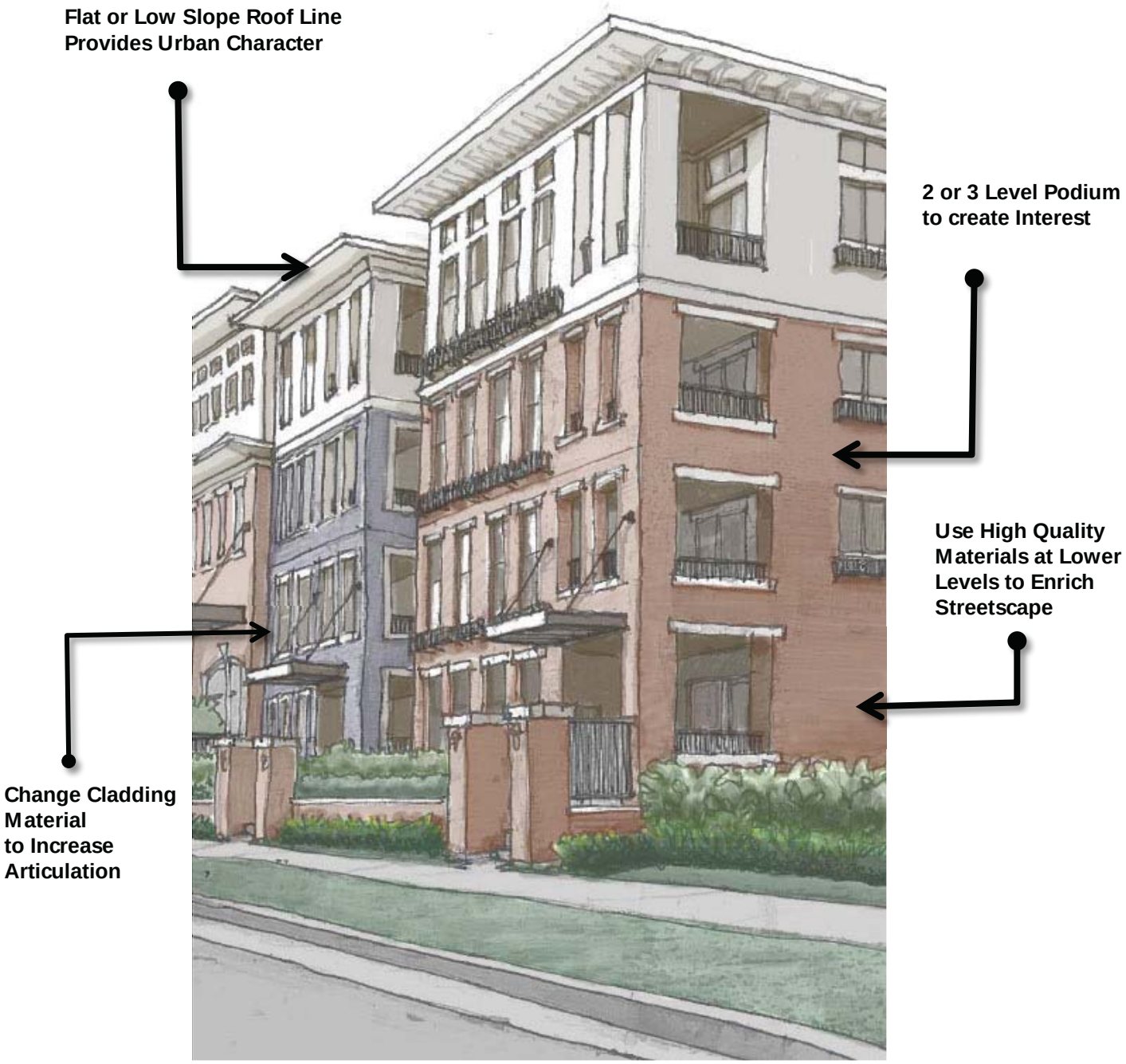
Guideline: Integrate firewalls into the design of the building and use them to scale down the long building forms.

Guideline: Consider a maximum 50m corridor length to walk to elevators.

Guideline: Add windows where stairs and lobbies have an exterior wall, for day lighting and operable windows should also be considered to allow natural air circulation.

Guideline: Encourage the use of stairs rather than elevators by designing stairs to be attractive and located to be convenient i.e. a wider, glassy stair located at elevator lobby and end of corridors.

Guideline: Use high quality materials such as brick masonry, particularly at the lower levels of the streetscape.


Flat or Low Slope Roof Line
Provides Urban Character
2 or 3 Level Podium
to create Interest
Use High Quality
Materials at Lower
Levels to Enrich
Streetscape
Change Cladding
Material
to Increase
Articulation

10.7

10.8 PLAZAS & OPEN SPACE

Successful plazas and public gathering spaces are an important component to create an engaging urban city.

Plazas and publically accessible open spaces provide visual experiences as well as space to play, to rest and to socialize. These spaces need to be both aesthetically pleasing and functional. Each development site should be considered as an opportunity to contribute to public open space.

This section provides guidelines that are applicable to corner plazas in residential developments as well as neighbourhood plazas as part of mixed use and commercial areas.

Ground Plane/Street Interface

Ensure Good Visibility and Safety

Good visibility from public areas such as streets welcomes people into the open space. It signifies that it is a public space, it allows users to watch street activity and it makes the space safer.

Guideline: Minimize walls and raised planters and locate the plaza at street level, with a "seamless connection" to the street and clear sightlines across the open space.

Guideline: 2 to 3 edges of the plaza should front streets to ensure the safety of users and appropriate use.

Guideline: Face commercial shop fronts or front doors of residential townhouses onto the open space.

Guideline: Avoid parking lot interface.

Guideline: Maximize active users of the plaza by orienting lobbies and entrances onto the open space.

Guideline: Define private spaces from public and semi-public spaces with low planting or decorative fencing.

Include Activity Generators

Successful plazas are generally characterized by several activity generators. Examples of such activity generators include food and retail outlets, as well as entertainment, which attract users and encourage socializing, relaxation and festivities. Studies have shown that active edge conditions such as front gardens, balconies, and sidewalk cafes increase the vibrancy and "staying time" in plazas and open spaces.

Guideline: Surround two to three sides of the plaza with active uses

Provide Wind and Weather Protection

Wherever possible, protection should be offered from prevailing southeast winds and strong northwest winds during fall and winter rainstorms. Higher wind speeds from surrounding high-rise buildings can cause user discomfort and should be prevented or reduced through specific design measures.

Guideline: Consider weather protection for open spaces particularly where commercial uses line the edges. Such protection should be provided at waiting points and along major pedestrian routes.

Maximize Sun Access and Consider Views

Sun paths, sun altitudes and shadow patterns in the plaza should be examined for all seasons, particularly the spring and autumn. Sunlight is particularly valued at lunch time in commercial business areas. Shade trees should be considered for the summer overheating period.

Guideline: Provide analysis that shows shadow impact on open space at 10 am, noon, and 2 pm at Equinoxes from adjacent developments.

Guideline: Take advantage of distant views to the mountains, Mount Baker, Fraser River and other landmarks.


Provide 2 to 3 Street-front Edges
Face Commercial Shops or Residential Units onto Plaza
Consider Weather Protection
Locate Plaza at Street Level

10.8

General Site Design

Provide Spatial Variety and Enclosure

Unless there is a specific symbolic or functional desire to accommodate large scale activities, large open spaces should be spatially defined into smaller, more easily identifiable and relatable areas. These smaller areas facilitate orientation and territory definition. People commonly gather at articulated edges in or around a plaza.

Guideline: Design smaller spaces within the plaza to engage a richer depth of perception (spaces within spaces)

Guideline: Define the edges and establish a sense of enclosure through the use of canopies, trees, arcades and trellises. These elements must be balanced with issues of visibility and defensibility.

Provide Appropriate Lighting

Lighting of a space has great impact on safety, visual quality and orientation of a space. It can also be used to create "art" and interest.

Guideline: Consider incorporating lighting as a public art feature.

Guideline: Provide night time generalized lighting to enhance safety of a plaza, particularly if it functions as a short cut or as a through route for pedestrians.

Guideline: Use subtle, pedestrian lighting in character with the overall design.

Provide Amenities that Encourage Quality "Staying time"

To make public spaces inviting and places where people gather and linger, the choice of seating needs to be carefully considered. According to research, both location and comfort of seating greatly influence the quality and length of stay in a space.

A plaza which is furnished with a variety of amenity features encourages general public usage and creates a sense of liveliness and excitement. Good seating is important to plaza users, without it, fewer people will stop to use a space.

Guideline: Provide many types of seating and maximize opportunities for sitting: walls, steps, planters, pool edges, lawns. Provide a variety of seating types in groups/couples/alone, which can be fixed and moveable, and disabled accessible.

Guideline: Locate seating toward the street, oriented to a view, near building entrances, next to attractions/amenities, in shade and in sun.

Guideline: Provide comfortable seating: provide warmth: generally wood is preferable to stone, concrete or metal; provide contoured seating, preferably with a back and armrest.

Guideline: Design furnishings in character with the City Centre palette of furnishings and landscape treatments (see City Centre Road Standards).

Include Amenities to Create a Sense of Place and Identity

Guideline: Consider using art work as a focal point for the plaza or become an integral component of the overall design of the plaza.

Guideline: Ensure public artwork is highly visible to all users.

Guideline: Include practical and essential elements such as bike racks, drinking fountains and waste receptacles.

Guideline: Mitigate noise from traffic through the introduction of different elements such as fountains or waterfalls.


Consider Public Art as Focal Point
Provide Seating
Provide sense of Enclosure with Trees

Include Natural Elements

To enhance the green elements of City Centre, open spaces should exhibit important ecological values and be connected to larger, continuous natural corridors. Provision of landscape areas for habitat, song birds, and large trees is essential.

Guideline: Provide lawn areas whenever appropriate to visually "soften" the urban environment and to provide an effective dry weather seating area.

Guideline: Provide integrated stormwater management features.

Guideline: Ensure plants are of the highest quality and in sufficient quantity and scale to make an impact.

Guideline: Select and locate plantings so that their functional and aesthetic qualities can be maximized.

Guideline: Incorporate irrigation and adequate drainage to assure plant survival over time.

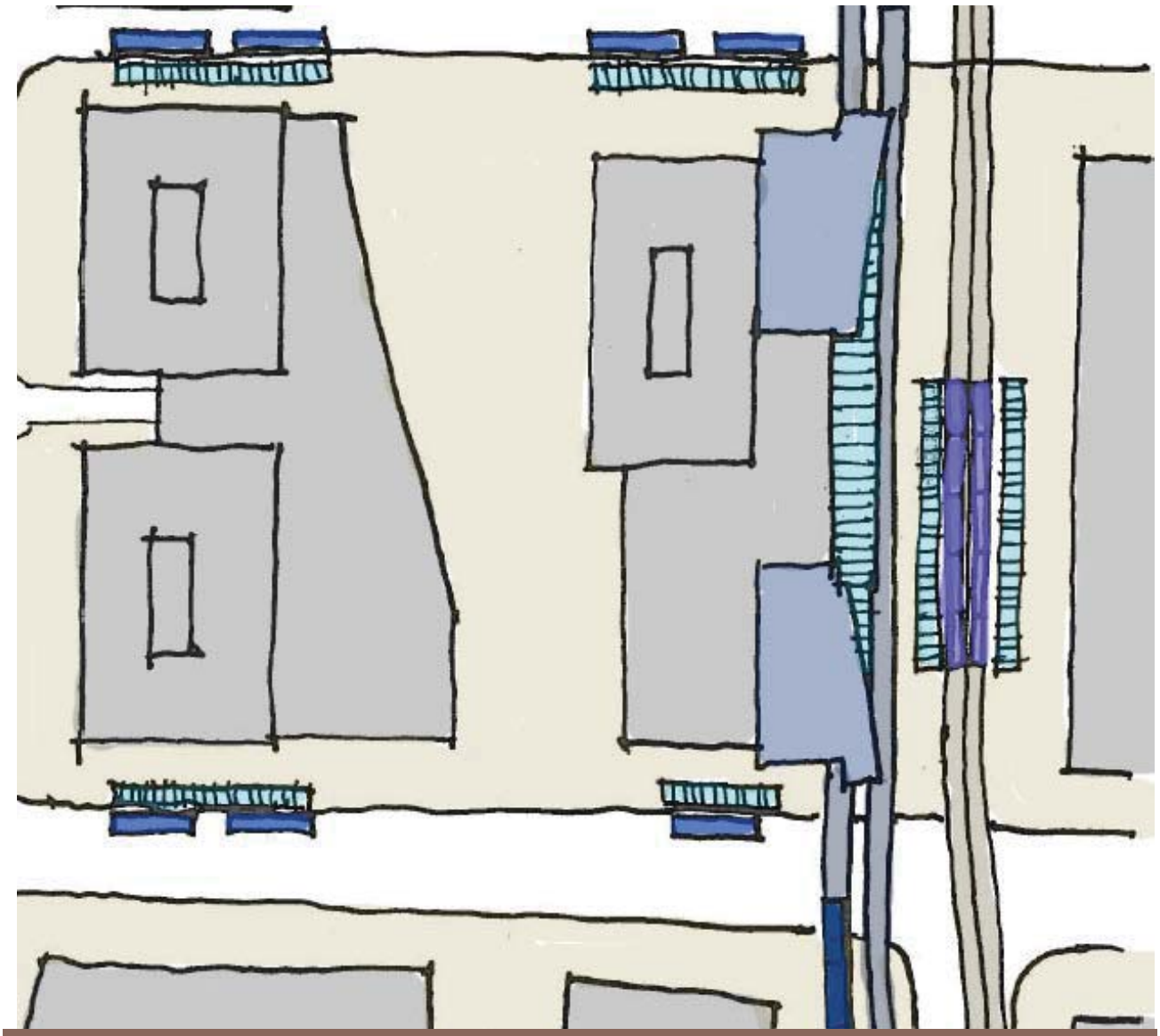
Guideline: Group plants according to their water needs and select plants to minimize watering needs. In rain gardens, select plants that can tolerate both dry and wet conditions.

Guideline: Consider the establishment and maintenance of the planting area. Specify plants for the level of maintenance planned at the site.

Guideline: Select plants from the list of plants approved by BC Hydro (refer to the chart " Suitable Species for Planting in BC Hydro ROW.") within BC Hydro utility rights-of-way. Seek approval from BC Hydro for any other plant that is proposed for use within a ROW.

Guideline: Provide natural elements which reflect seasonal change, such as water and trees, shrubs, ground covers, vines and flowers in a variety of colours and textures.

Guideline: Emphasize natural landscapes with which children can interact as a means to gain a better understanding of and appreciation for nature.



SECTION 11
Development Policies

11
DEVELOPMENT POLICIES

This section describes specific development policies to implement the plan vision described on Part A of the Plan. These policies should be applied in conjunction with Part B of this document.

11.1 OVERVIEW OF DEVELOPMENT POLICIES

Several policies have been developed to support the build out and development of a vibrant and successful City Centre Plan. This includes land use related requirements such as guidance for ground floor interface conditions and policies for providing outdoor amenity space.

Transportation related policies have been established to deliver the finer-grained road network and improve walkability in the downtown. This includes criteria for block size as well as guidelines for special conditions.

These policies should be applied in combination with Part A & B of this document.

11.2 SINGLE FAMILY AREAS

Infill and Density

Two areas of single family areas have been identified in the plan: one area in the north-east and the other at the south west. The single family designation has been established to retain the single family housing form within the downtown. To continue to allow gentle densification however, the single family designation areas will allow gentle infill redevelopment into ground-oriented housing. This includes subdivision of larger lots to allow small-lot single family homes and/or duplexes and in some cases low density townhouses.

In the Bolivar Neighbourhood**,** small lot, infill densities may be supported along Grosvenor Road, and 112 Avenue. The properties facing onto the future Grosvenor Park will be considered for small lots, with provision of new roads and lanes. Buildings should face directly onto the park to provide natural surveillance of the park site.

Redevelopment to small lot single family residential zones may include RF-10 and RF-12, RF-SD, and CD zones to allow manor houses. A finer-grained street grid network must be provided for this building form.

In the Holland Park Neighbourhood, density increase will be permitted along 96 Avenue, 100 Avenue, 134 Street and 132 Street, to allow for arterial street widening.

Neighbourhood Retail and Service Uses

Small-scale neighbourhood retail and service uses such as coffee shops, hair stylist, florists, or health practitioners may be permitted in single family residential neighbourhoods. These may be provided in the form of RF-9S Special Residential Zone type development that permits a maximum of 30 percent of the floor area for non-residential uses as part of a live-work development.

11.3 GROUND FLOOR USES IN MIXED USE AREAS

Ground Floor Uses

To facilitate pedestrian engagement and vibrancy along the street, three ground-floor use classifications have been developed for buildings in mixed-use areas: highly active, less active, and choice of use. These requirements are largely influenced by density and proximity to transit stations. Major destinations and close proximity to transit stations will create high pedestrian volumes and therefore, developments in these locations will be required to provide " highly active" uses at the street level. Locations further away from the transit nodes with lower densities will generate comparatively lower pedestrian volumes and, therefore those mixed-use buildings may provide " less active" uses at street level.

Highly Active

Highly active uses will be required in areas with close proximity to transit. These areas are shown on **Map 21.** In these areas, the ground floor will be required to have pedestrian friendly uses that facilitate street-level activity including::

- Retail and commercial such as: restaurants & coffee shops, specialty grocery, general and personal service including bakeries, small art galleries and flower shops.
- Interactive uses such as outdoor café space and merchandise display such as flowers or produce.
- General and personal service uses such as barbershop, beauty parlour, shoe repair, dry cleaners, small neighbourhood pubs, may be considered if design criteria is met (see Design Guidelines).
- Entertainment and attractions that generate demand during mid-day, evenings, and weekends.
- Artist Studios, live-work uses with retail space at storefront in the Historic District.

Less Active

Less Active uses are typically better located on floors above active ground floor uses, however, areas with lower pedestrian volumes, or areas further from transit nodes will permit less active uses at ground floor as shown on the map. In these areas:

- Ground floor high intensity office with large floor plates (head office, large medical building, institutional and civic uses) will be permitted. Large office frontages should include a component of active retail such as coffee shops, convenience retail etc.
- Smaller ground floor small office and service uses including child care, small fitness/yoga studios, medical clinic, business services, banks, lawyers office, dry cleaners will also be permitted.
- Institutional uses such as a performing arts centre, churches, schools, care facilities, and supportive housing will be permitted. These uses should consider a small component of active use at ground level. Residential uses permitted on upper levels only.

Choice of Use

- Combination of highly active, less active and residential uses.
- Mixed use areas across a street or lane from a residential designation will need streetscape design that knits together commercial and residential (see Design Guidelines).

Consider Adjacent Residential

- Residential use may be most appropriate

Map 22 Ground Floor Interface in Mixed-Use Designations

11.3

11.4 SMALLER RESIDENTIAL UNITS

Micro-Suites

Micro-units are a newer type of smaller housing unit in Surrey which may provide affordable housing options for single households, such as for working professionals and students. Research on the new trend toward micro-units, shows that smaller units appear to be popular in areas where the price of real estate is generally very high (examples include: Vancouver, San Francisco, Boston). They provide a more affordable option for either gaining entry into the housing market or securing rental suites through Housing Agreements.

In these urban areas where micro-suites are being built, the limited space in these units is off-set by higher locational amenities, so although the units are smaller in size, they are located in areas with high amenities and in close proximity to transit.

In Surrey's City Centre, micro-suites are defined as self-contained residential units which are between 320 square feet and 375 square feet.

Since neighbourhood amenities are not as densely developed in City Centre, as some of the cities experiencing the construction of micro-units, locational and development criteria has been established for these unit types.

The design of a micro-suite is an important factor to the liveability of the unit. The plan provides design direction for these units in the Micro-unit Guidelines section of the Design Guidelines. Below are some general micro-unit criteria related to land use and location:

- The minimum micro-unit size recommended is 320 square feet.
- Micro-units will only be permitted within 400 metres to the rapid transit stations or large scale educational institutions.
- A broad range of unit sizes are recommended within each residential development.
- To avoid an over-concentration of micro-units in one building, these units should not comprise more than 50% of the total units in a building to a maximum of 150 micro-units per building.
- Consideration for more than 50% of total micro-suite units in a building will be considered on a case-by-case basis for special populations

. Lock-off Suites

Secondary suites within apartments are referred to as " lock-off suites" . These unit types offer another option for smaller suites that can be enable condominium owners to rent out or have flexible extra space in their homes. These suites can allow the larger unit to adapt change over time according to the needs of the unit owner. For example, the lock off suite can also be used as an extra bedroom for family, a student, an in-law suite, or a unit for a care-giver or nanny.

As a response to a greater need for rental housing and unit-type diversity, some developers in Surrey's City Centre have requested that a proportion of the residential units in their development be permitted to have lock-off suites. Lock-off suites will be approved on a case-by-case basis as pilot projects. Policy and guidelines will come forward after these unit types have been built and tested in Surrey.

11.5 PUBLIC OUTDOOR AMENITY SPACE

Access to outdoor space is an important component for creating a livable and healthy downtown. To meet this goal, the City Centre Plan has proposed parks within 400 metres of all residents. However, these parks will not provide sufficient space for the anticipated higher residential and employment densities proposed for the downtown; additional space will be needed. Development Permit Area Guidelines within the Official Community Plan provide policy direction for providing publically accessible open space as part of urban redevelopment.

To supplement city-owned parks and plazas, multi-family developments will provide publically accessible open space within their development. Publically accessible open spaces may include corner plazas, mini parks, walkways and other on-site public amenity.

These spaces should provide a high level of amenity and design, including elements such as seating, public art, fountains, specialty surfaces treatments, landscaping and enhanced stormwater features.

Public Outdoor Amenity Space Policy

To support the inclusion of publically accessible outdoor amenity space in private developments, Surrey's Policy O-48 has been revised to allow a maximum of 0.75 square metres [8 sq. ft.] per dwelling unit of the outdoor amenity space requirements of the Surrey Zoning By-law, to be provided as public outdoor amenity space as follows:

(a) The public outdoor space may be located within setbacks;

(b) The public outdoor space shall be designed for the use of the public and may include plazas, seating, decorative pavers, water features, high quality landscaping and public art, and found acceptable to the City; and

(c) The public outdoor space shall be secured by a statutory right-of-way.

(d) Outdoor amenity space design guidelines are outlines in Section 10 Design & Guidelines.

11.6 CONNECTIONS TO PROMOTE WALKABILITY

As redevelopment occurs, developments will provide new roads, green lanes, and pedestrian walkways to create smaller, more walkable block sizes. The increased connectivity will support walkability by allowing pedestrians, cyclist and cars shorter distances and increased routing options to major destinations.

Density and Block Size

The land use plan shows the minimum street and lane network that will be required; however to achieve a block size that promotes high connectivity, additional streets, green lanes and pathway connections may be required at time of development. The ideal block size will vary depending on the form of development and site size, but in general, a block should be no longer than 80 to 100 metres before a connection is provided.

Density will be calculated on the gross site area in order to encourage smaller block sizes without impacting the overall density yield on a development site.

Off-set Lane Alignment in the Forsyth District

A distinguishing feature of the Forsyth District will be a higher density of green lanes that will be established through an off-grid alignment pattern. Although this pattern is not preferred, it may be necessary to achieve connectivity in established areas of the residential neighbourhood. These existing sites were built in the 1980s and 1990s and did not provide the finer-grained pedestrian connectivity the plans aims for today. As a result, the remaining development parcels will provide green lane connections as incremental redevelopment occurs. In some cases, the lanes may need to be off-grid to integrate with existing development blocks.

SECTION 12
Servicing and Financing

12
SERVICING AND FINANCING

12.1 OVERVIEW

Effective and reliable utility infrastructure is critical to supporting a viable and sustainable City Centre.

While there is utility infrastructure already in place in City Centre, the projected growth and development outlined in the plan area will result in a need to expand and update this infrastructure to meet the growing demand for services.

There will also be a need to provide increased amenities for the future residents in City Centre. This will include additional amenities within the parks, pathways and open spaces, as well as a need for additional fire and police protection services and additional library materials.

This section outlines the utility infrastructure servicing strategies and the financial strategies to implement the required infrastructure and amenities.

12.2 SERVICING

Stormwater

City Centre's stormwater management strategy models sustainable practices by protecting life and property, mitigating adverse impacts of stormwater runoff quantity, quality and velocities on watercourses, protecting riparian habitat and supporting aquatic life.

Development in City Centre has changed the natural hydrologic cycle. Changes include higher stormwater flow rates and volumes, decreased groundwater recharge and reduced base flows to nearby watercourses. Urbanization has impacted surface and groundwater quality, due to pollutants from vehicles and other human activities that are carried by stormwater runoff to downstream environments. Stormwater from City Centre flows into Bolivar Creek in the north and Quibble Creek in the south. The City's Watercourse Classification Map shows Quibble Creek and most of its branches are in the 'Class A' category ('inhabited or potentially inhabited by salmonids year-round'); Bolivar Creek is a combination of 'Class B' ('significant food/nutrient value') and 'Class A'.

Development has encroached on several reaches of Quibble Creek and its tributaries, narrowing or eliminating riparian corridors. Given future development projections for City Centre, key stormwater issues to address include:

1. Adequately service the area to protect life and property;
2. Mitigate the adverse impacts of urban runoff water quality on watercourses;
3. Mitigate the adverse impacts of peak flows and velocities in the watercourses; and
4. Protect the riparian habitat and support the aquatic life along the watercourses.

The City has implemented a number of stormwater infrastructure upgrades in City Centre that consider the impacts of future development, including storm sewer upgrades, diversion sewers and detention ponds. The servicing strategy will maximize the use of the existing infrastructure and require additional mitigation measures as needed to limit the impact on available resources.

City Centre is envisioned as a model community for sustainable stormwater management in Surrey. Developments will utilize a variety of onsite stormwater best management practices (BMP) that strive to mimic the natural hydrologic cycle, allowing peak flows and volumes to be controlled while supplying groundwater recharge and adequate base flows to receiving watercourses. Water quality treatment is provided so runoff can have a beneficial impact on the surrounding environment. The stormwater management strategy services City Centre by protecting life and property, mitigating adverse impacts of stormwater runoff quantity, quality and velocities on watercourses, protecting riparian habitat and supporting aquatic life.

Quibble Creek

Implementation

The City has constructed most of the stormwater infrastructure works necessary to address the 100-year return period event in City Centre. To mimic the natural rainfall-runoff response of the area prior to development, as well as protect downstream properties, infrastructure, and natural resources, the following BMP strategy is recommended:

- Onsite BMPs to address runoff volume and flow control;
- Water treatment facilities to remove pollutants from stormwater runoff before discharging into Quibble and Bolivar Creeks; and
- No further encroachment by development on riparian areas.

Developers will be required to include BMPs in their site development plans to ensure early incorporation of the works into the site design.

Flow and volume control BMPs should use infiltration techniques wherever possible; where infiltration is not possible, evapotranspiration techniques can be used. Sites will be required to implement detention facilities if infiltration and evapotranspiration techniques are not feasible.

Further details on stormwater servicing examples for City Centre can be found in **Appendix A-2.**

Sanitary Sewer

City Centre Today

The current sanitary sewer system was installed during a period of initial development in City Centre in the 1960's and 1970's, and has undergone some localized upgrades in recent years to support new developments.

The NCP area is divided into two sanitary catchments based on local topography. The north catchment drains by gravity to the north and discharges to Metro Vancouver's North Surrey Interceptor (NSI) near 132 Street and 114 Avenue. The south catchment drains by gravity to the south to the Quibble Creek sanitary pump station at King George Boulevard and 94A Avenue, where flows are pumped back to the north catchment via forcemain and subsequently discharged to the NSI.

Most of the existing sanitary sewers in City Centre are comprised of asbestos cement or vitrified clay; these are non-standard materials that are generally not available and are no longer permitted for new installations per the City's Design Criteria, given that longer lasting materials are readily available.

Given sewer age and material composition, City Centre experiences high levels of rainwater and groundwater intrusion (otherwise known as inflow and infiltration, or I&I) into the sanitary sewer system; this reduces the system's ability to convey wastewater. High I&I levels are of particular concern in the northern portion of the NCP area.

The projected growth outlined in the NCP will exceed the capacity of several existing sanitary sewers as well as the Quibble Creek sanitary pump station.

In the future, residents, businesses and institutions in City Centre will be serviced by a complete and robust sanitary sewer network that effectively captures and conveys wastewater. Sanitary infrastructure will be designed to optimize the function and use of the existing sewer system, while replacing aging infrastructure, minimizing rainwater and groundwater intrusion, and supporting future growth.

Implementation

Sanitary infrastructure is designed to optimize the function and use of the existing sewer system, while replacing aging infrastructure, minimizing rainwater and groundwater intrusion, and supporting future growth.

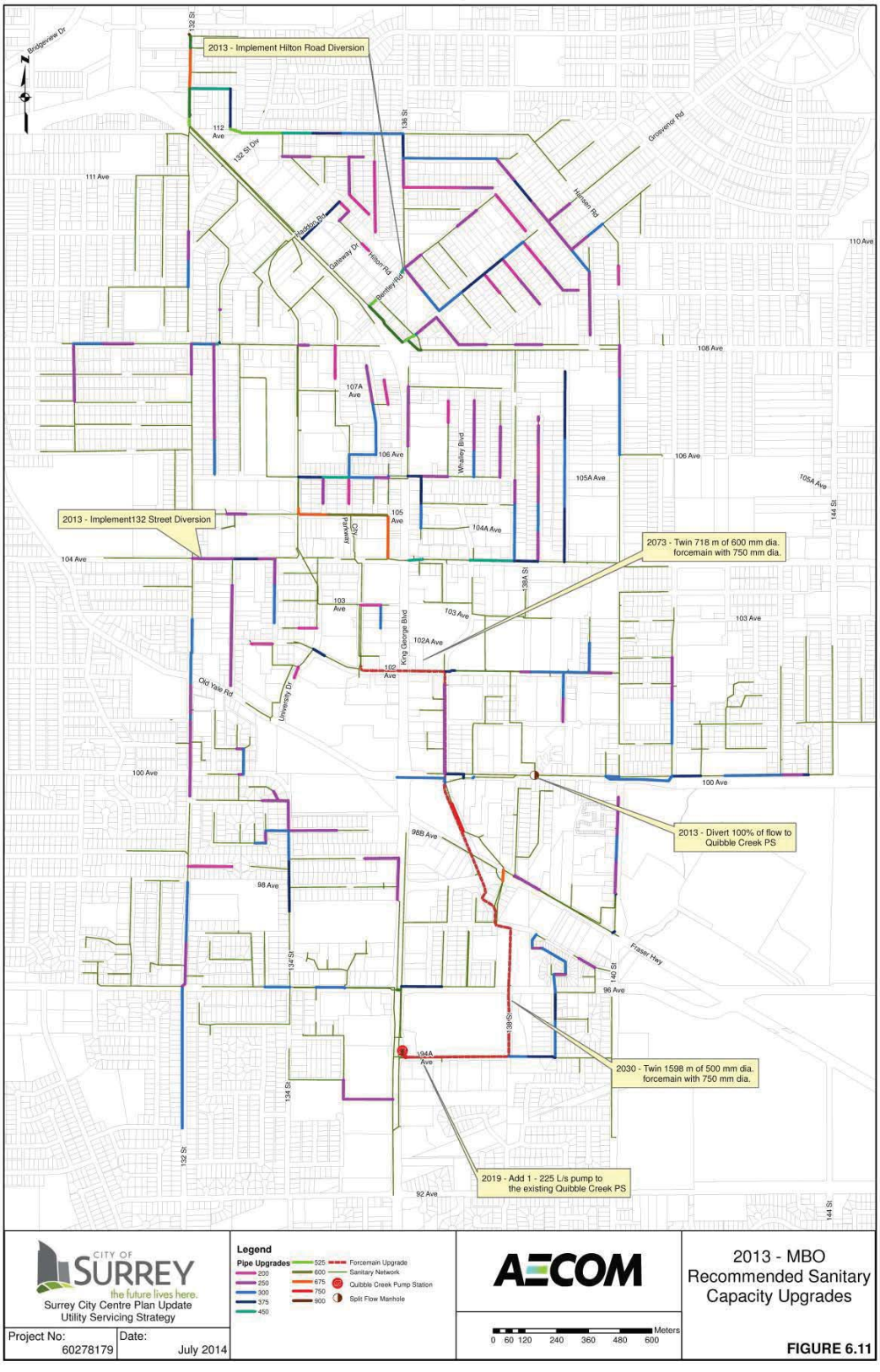
A phased sanitary infrastructure upgrade and replacement strategy is recommended based on the anticipated development timeline and projected population growth. Upgrades will ultimately be driven by the pace of development in the NCP area.

While numerous sanitary sewer upgrades are proposed, several diversions are also proposed to optimize the capacity of the existing sanitary sewer system, delay some sewer replacements and minimize the total cost of upgrades required to support future development. Sewer diversions are proposed at the following locations:

- 132 Street and 104 Avenue
- Hilton Road and 136 Street
- 100 Avenue and 138A Street

The capacity of the Quibble Creek sanitary pump station will be increased in the short term with the addition of a fourth pump; twinning of the existing forcemain from the pump station to the north catchment will be required in the longer-term. At build out conditions, approximately 21.2 kilometres of gravity sanitary sewer will have been replaced in the NCP area.

Recommended sanitary infrastructure upgrades are summarized on **Map 22**. Further details on sanitary servicing requirements for City Centre can be found in **Appendix A-2.**



Map 23 Recommended Sanitary Capacity Upgrades

12.2

Water

City Centre Today

The current water system was installed during a period of initial development in City Centre in the 1960's and 1970's, and has undergone some localized upgrades in recent years to support new developments.

City Centre straddles the pressure zone boundary that separates the 135 m HGL Kennedy pressure zone from the 155 m HGL Whalley pressure zone. The Kennedy pressure zone is generally serviced by the Kennedy Pump Station, while the Whalley pressure zone is generally serviced by the Whalley Pump Station and the Whalley Booster Station. There are some areas within City Centre that do not currently meet the City's minimum 40 psi Peak Hour Demand (PHD) pressure criteria. If City Centre grows as predicted, existing low pressure concerns may increase if no improvements are made to the system.

The City's well developed water system services most of North Surrey; therefore, the ability of the water system to service City Centre is heavily influenced by water demands from areas outside of City Centre.

The existing water system does not have sufficient capacity to support future service demands in City Centre.

Going forward, the City's water system will continue to deliver safe and reliable drinking water to residents, businesses and institutions in City Centre, water infrastructure will be designed to optimize the function and use of the existing water system, while replacing aging infrastructure and supporting future growth.

Implementation

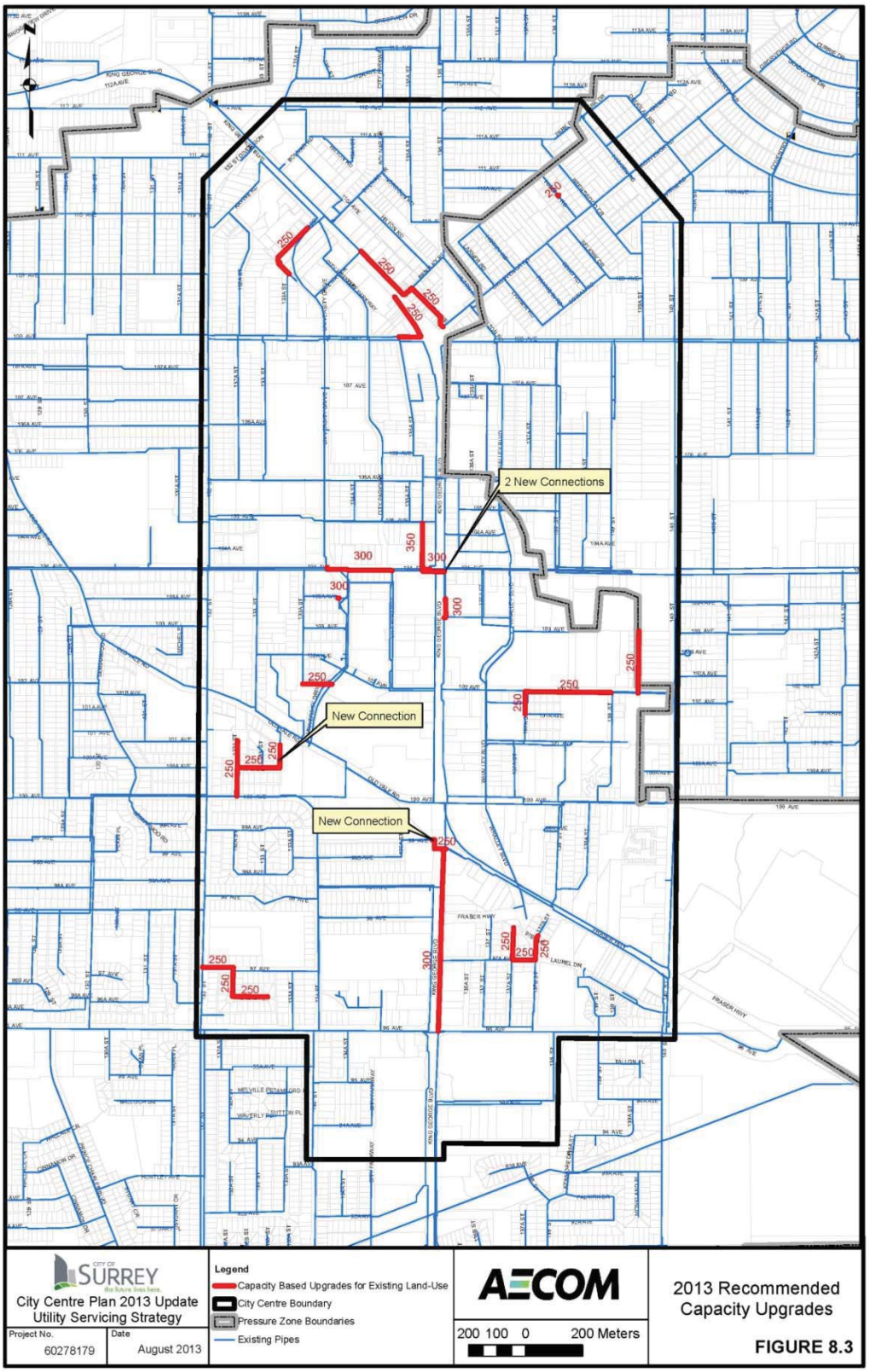
Water infrastructure is designed to optimize the function and use of the existing water system, while replacing aging infrastructure and supporting future growth.

A phased water infrastructure upgrade and replacement strategy is recommended based on the anticipated development timeline and projected population growth. Upgrades will ultimately be driven by the pace of development in the NCP area.

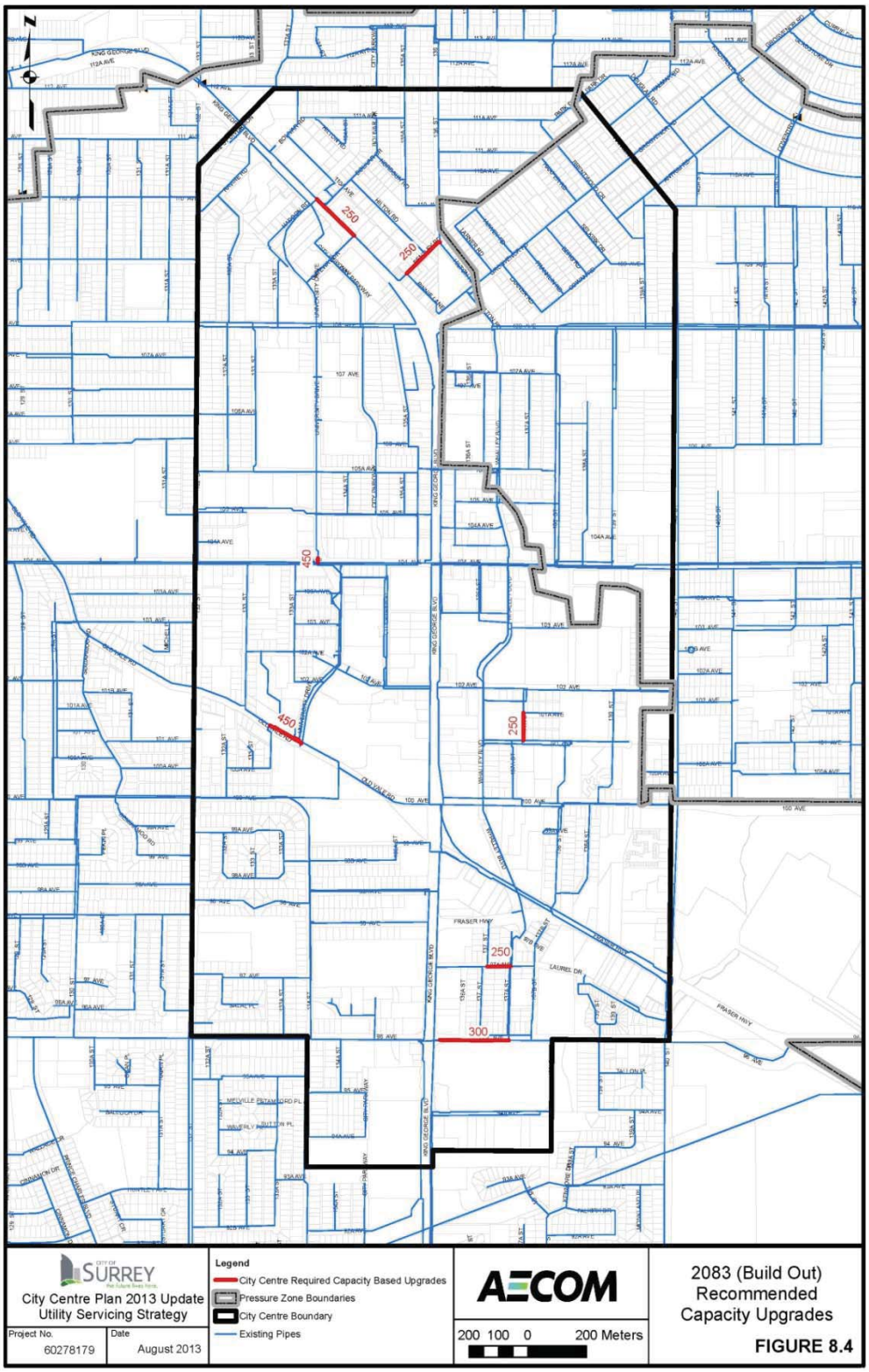
The proposed servicing plan will utilize water from the Whalley Pump Station to meet the increasing water demands in City Centre. The approach will employ a feedermain that directly connects the Whalley Pump Station to the 135 m HGL Kennedy pressure zone, along with upgrades to the Whalley Pump Station and Whalley Booster Station. Additional bulk water supply for the area will be provided by construction of Metro Vancouver's Fleetwood Reservoir by 2023.
A boundary shift between the Kennedy and Whalley pressure zones is also recommended to address low water pressure issues that could occur during peak water demand periods.

Watermains throughout the City Centre will ultimately be upgraded to a minimum 250mm diameter size when the watermains reach the end of their useable life or as development proceeds. In addition, the City will require that all watermains be looped within City Centre.

Recommended short term water system upgrades are summarized on **Map 22**. Upgrades to support the full buildout of City Centre are summarized on **Map 23**. Further details on water servicing requirements for City Centre can be found in **Appendix A-2.**



Map 24 Recommended Short Term Water System Upgrades



Map 254 Recommended Full Build Out Water System Upgrades

District Energy

District Energy serves as a cornerstone of the City's strategy to transition to renewable low-carbon energy sources, reduce GHG emissions and increase community resilience to higher energy prices. Slated to be one of the largest networks in North America, it will deliver approximately 16,000 tonnes of GHG savings per year by 2035, integrating various forms of renewable low carbon energy such as Renewable Natural Gas, biomass and waste heat.

District Energy (DE) systems produce hot water at centralized facilities and then distribute the hot water, by way of a dedicated pipe system, to heat buildings and heat domestic hot water in a defined neighbourhood, or "district." Surrey City Energy (SCE) is a City-owned DE utility that supplies all high-density residential, commercial and institutional buildings in City Centre with heat and hot water.
SCE Objectives:

- Improve energy efficiency
- Reduce Greenhouse Gas (GHG) emissions
- Increase the resilience of our energy supply systems
- Provide competitive and stable long-term energy pricing

The expected growth and density of future development outlined in the City Centre NCP make this area a particularly viable location for DE.

The development of DE in Surrey has seen a number of milestones including feasibility studies, creation of a City-owned energy utility (SCE), and a City Centre District Energy System Bylaw which mandates DE-compatible hydronic systems for all new high-density buildings in City Centre while also mandating connection to the City's DE system within a core service area (refer to Service Area A shown in **Map 23** as contained in the District Energy System By-law, 2012, No.17667).

SCE commenced service to its first customer in 2015 and has continued to grow its customer base in step with new development.

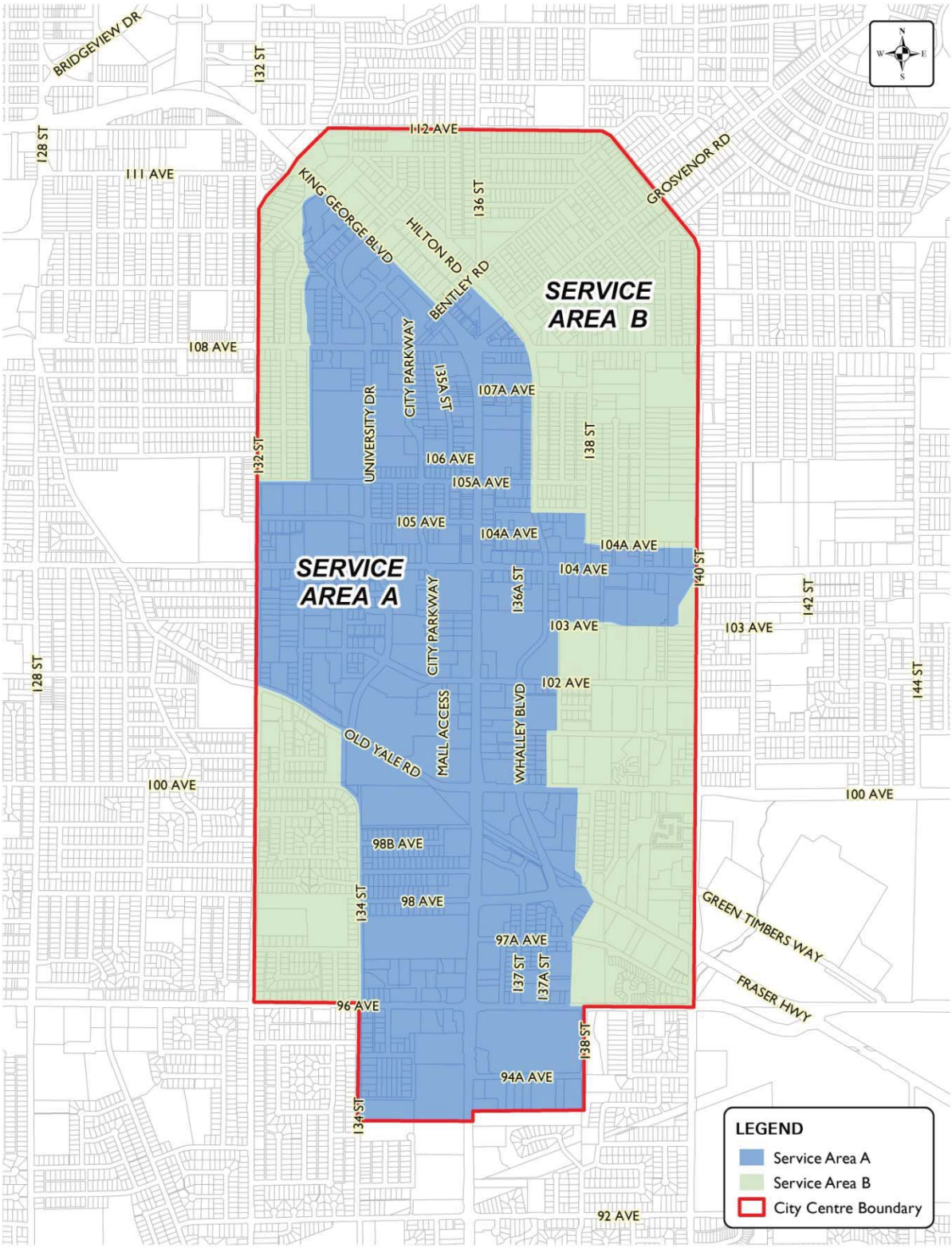
The initial phases of the system rely on natural gas as a 'start-up fuel' and, as the system grows, natural gas will remain a peaking fuel source providing added redundancy to the system. Integration of renewable fuel sources will be phased in over time as customer demand grows.

Surrey has developed a 30-year financial plan for DE in City Centre, which includes the long-term capital and operating costs associated with owning and operating the DE system. This plan also includes the costs of integrating various forms of renewable low carbon energy such as Renewable Natural Gas (RNG), biomass and waste heat. This financial plan is accompanied by a detailed rate model that projects the rates and rate escalation that will be required over the 30-year period to ensure that the utility fully recovers all of its costs.

Implementation

SCE follows a cost of service rate setting methodology that ensures that all costs associated with owning and operating the utility are recovered through customer rates. By leveraging synergies with other City services as well as the City's low cost of capital, SCE is able to deliver community-scale emissions reductions, long-term energy resilience and price stability to all customers at competitive rates without placing an economic burden on the community.

Unlike buildings heated by conventional building-scale heating systems, customers of SCE pay a rate for end-use heat that encompasses the costs of long-term operations, maintenance and infrastructure replacement. Accordingly, decisions on heating infrastructure investments are made by SCE based on efficiency, environmental performance and lifecycle cost.



Map 265 District Energy City Centre Service Areas

12.2

12.3 FINANCING

Utilities and Transportation Infrastructure

A robust network of water, sanitary sewer, storm sewer and transportation infrastructure is required to support the transition to higher density development in City Centre. Sanitary sewer, water and stormwater infrastructure improvements needed to support the development of the City Centre for the next 10-years are included the current version of the 10-Year (2016-2025) Servicing Plan and the expected development cost charge (DCC) revenue from development in the City Centre area is sufficient to fund these improvements.

All of the transportation improvements to support the development of the City Centre for the next 10-years, excluding property acquisition to achieve the finer grained road network, are included in the 10-Year (2016-2025) Servicing Plan. The expected DCC revenue from development in the City Centre area is sufficient to fund these improvements, excluding property acquisition to achieve the finer grained road network.

Operational and Maintenance Responsibilities

The development of City Centre will increase the total length of infrastructure that the City is required to operate, maintain and eventually replace.

Strategic Property Acquisition and Third Party Utility

In order to achieve the finer grained road network, a number of key properties need to be acquired. It is unlikely that these key properties will be dedicated to the City through a normal rezoning process. The estimated cost to acquire these properties is $60 million. The cost of these acquisitions is not included in the 10-Year (2016-2025) Servicing Plan.

In order to acquire all of the key properties to achieve the finer grained road network, it is recommended that an area specific DCC charge be established for the City Centre NCP area to fund the acquisition of key properties to achieve the finer grained road network.

Area Specific Development Cost Charge

The use of an area specific DCC is not new in the City. They have been used in other NCP areas (Anniedale-Tynehead, Highway 99 Corridor, Campbell Heights and West Clayton) to assist in funding the costs of new infrastructure where the DCC revenues on their own are not sufficient to fund the necessary infrastructure.

Table 5 provides an estimate of the area specific DCC rate that would be required to fully fund the acquisition of the finer grid road network in the City Centre NCP area. These rates were developed in accordance with guidelines contained in the DCC Best Practices Guide as published by the Ministry of Community, Sport and Cultural Development.

Table5 Area Specific DCC Rates for Finer Grid Road Network

Land Use	Proposed City Centre Area Specific DCC Rate (per sq. ft.)
Townhouse RM-10, RM-15, RM=23, RM-30, RC (Type III)	$2.83
Low Rise Apartment RM-45, RM-70	$2.62
High Rise Apartment RM-135, RMC-135, RMC-150	$2.09
Commercial - Ground floor	$2.79
Commercial - All other floors	$1.76

On May 16, 2016, the City introduced new DCC rates. **Table 6** provides a summary of the estimated DCC rate for City Centre.

Table 6 2017 (Estimated) Area-Specific DCC Rates for Finer Grid Road Network

Land Use	Existing City Wide DCC Rate (per sq.ft.)	Existing City Centre DCC Rate (per sq.ft.)	Proposed Additional DCC Rate for Strategic Property Acquisition in the City Centre (per sq. ft.)	Proposed City Centre DCC Rate (per sq. ft.)
Townhouse RM-10, RM-15, RM=23, RM-30, RC (Type III)	$17.06	$17.06	$2.83	$19.89
Low Rise Apartment RM-45, RM-70	$19.02	$14.20	$2.62	$16.82
High Rise Apartment RM-135, RMC-135, RMC-150	$18.74	$12.38	$2.09	$14.47
Commercial - Ground floor	$9.92	$9.92	$2.79	$12.71
Commercial - All other floors	$5.62	$5.62	$1.76	$7.38

Community Amenity Contributions

In accordance with City policy to address the amenity needs of proposed new residents in Plan Areas, all development proposals at the time of rezoning or building permit issuance will be required to make a monetary contribution towards the provision of police, fire protection and library services, and towards the development of parks, open spaces and pathways. These rates will be adjusted annually with the Consumer Price Index.

A new amenity contribution is being introduced in the City Centre Plan area to equalize the burden of undergrounding third party utilities (electrical, telephone, cable and internet). As part of the higher level of urban design in City Centre, all utilities are required to be located underground. Under the existing policy, there is an inequitable distribution of costs for undergrounding these utilities. Some properties are burdened with undergrounding utilities on two frontages while others have no requirement.

Undergrounding Third Party Utilities Amenity Contribution

The new Amenity Charge will be collected on all properties to equalize the cost of undergrounding third party utility infrastructure between all property owners. The estimated cost to underground all private utility infrastructure in the City Centre is $86.2 million, with the majority of these costs being related to the underground of BC Hydro utility infrastructure.

In order to distribute the cost of undergrounding third party utility infrastructure across all new developments in the City Centre, it is recommended that an amenity charge be established for the City Centre NCP area to fund the undergrounding of third party utility infrastructure and that this charge be collected on all properties at an equal rate per square foot of building area. The cost of this amenity charge is $1.66 per square foot of building area.

Park Amenity Contribution

The development of new parks and new park amenities identified within the plan will be funded through Parkland Amenity Contributions collected on new development. Staff completed a detailed needs assessment and costing exercise to determine an appropriate amenity level and associated funding requirements. Staff are proposing a variable Park Amenity Contribution rate, to acknowledge the reverse correlation between unit size and dependence on parks and outdoor public spaces. The resulting amenity rate is highest on a sq. foot basis for smaller units, and is lowest on the same basis the more bedrooms are added. The rates are as follows:

- $1,207 – Bachelor & Studio Units
- $1,375 – One Bedroom Units
- $1,554 – Two + Bedroom Units

Fire and Police Protection Amenity Contribution

Future development in City Centre will drive the need to upgrade existing fire and police protection facilities. A study of fire protection requirements in Surrey's neighbourhoods has established that a contribution of $281.46 per dwelling unit for single family and $1,125.83 per acre for non-residential development (in 2016 dollars) will cover the capital costs for fire protection. Similar to Fire Services, a contribution of $65.16 per single family dwelling unit and $250.56 per acre for non-residential development will cover the capital costs for police protection.

A variable rate for multi-family Fire and Police Protection Amenity is proposed as follows:

Fire Protection

- $ 84.44- Bachelor & Studio Units
- $ 112.59 - One Bedroom Units
- $ 140.73- Two + Bedroom Units

Police Protection

- $19.55 – Bachelor & Studio Units
- $26.06 – One Bedroom Units
- $32.58 – Two + Bedroom Units

Library Materials Amenity Contributions

A study of library requirements in Surrey's neighbourhoods has established that a contribution of $146.58 (in 2016 dollars) per dwelling unit for single family and $58.63 for multi-family (non-residential development is exempt) is necessary to cover the capital costs for library materials and services, which is sensitive to population growth.

A variable rate for multi-family Library Materials Amenity is proposed as follows:

- $43.97 – Bachelor & Studio Units
- $58.63– One Bedroom Units
- $73.29 – Two + Bedroom Units

Photo: Insert Location

PART D

Appendices and Acknowledgements

APPENDICES

A-1
CORPORATE REPORTS

List of Reports

Corporate Report No. C006

October 30, 2006

Corporate Report No. C020

April 30, 2007

Corporate Report No. R159

July 28, 2008

Corporate Report No. C001

February 9, 2009

Corporate Report No. R151

July 25, 2011- City Centre Plan Stage 2 Update

Corporate Report No. R114

July 28, 2012- City Centre Community Building Strategy

Corporate Report No. R155

July 17, 2013- City Centre Update

A-2 CONSULTANT REPORTS AND OTHER REFERENCES

Reference List

A-2.1

Consultant Report

STORMWATER INFRASTRUCTURE

7 Stormwater Infrastructure

The City Centre vision is to be the Fraser Valley's metropolitan centre supporting vibrant downtown neighbourhoods, a dynamic business sector, as well as civic, university and hospital districts. In addition, Surrey's goal is for the City Centre to be one of North America's most sustainable downtowns.

The following reference to storm drainage system needs within City Centre is taken from the July 2008 City Centre Plan Update for Council:

"Sustainable drainage features are supported for volume reduction and water quality purposes. Opportunities for implementing best management practices, such as "green" practices in all new development projects, would reduce the need for significant stream restoration works and will be investigated as part of this study".

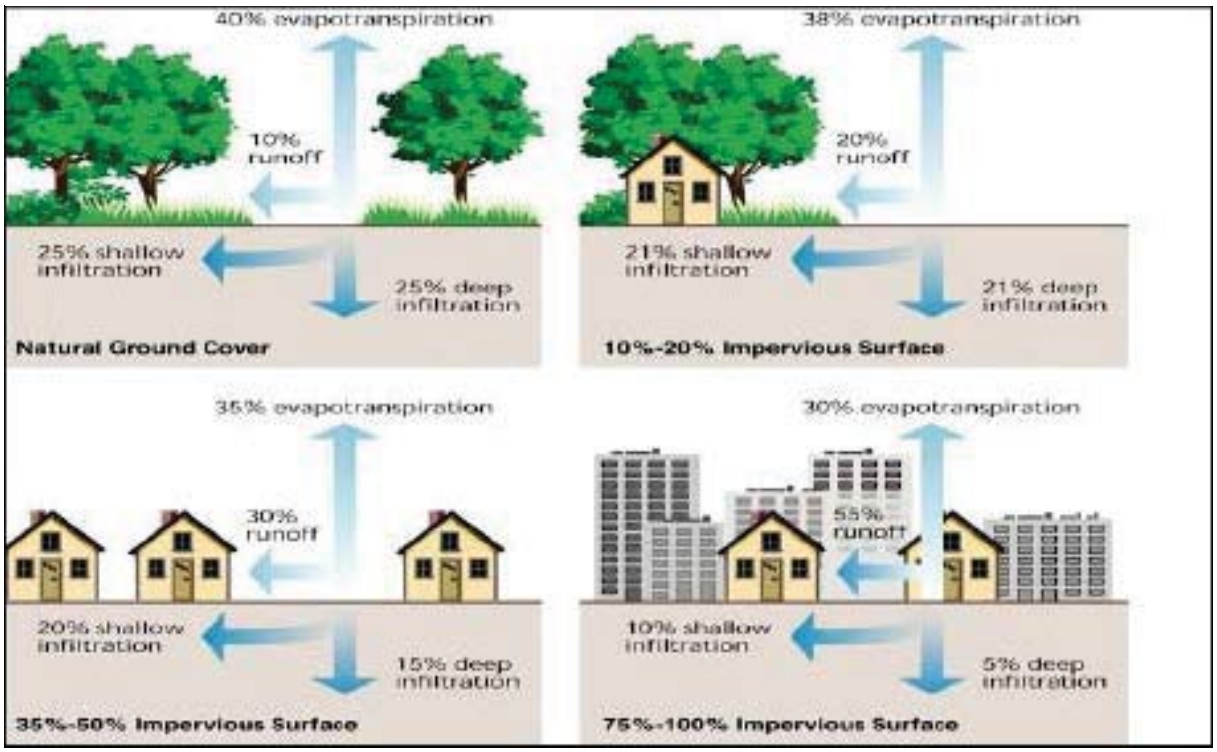
The objective of this study is to identify options for managing the stormwater, including the best management practices referred to above, while supporting the Surrey City Centre vision of a sustainable, liveable and dynamic community.

Urbanization and Stormwater Impacts

Prior to development, most native soils have sufficient permeability to absorb and infiltrate rainwater. This is because of a combination of factors, including the structure of the soil, the connected pores and channels created by plant roots, and the presence of leaf litter and other organic matter. Because most rain storms are not large enough to exceed the soil permeability and completely saturate the native and undisturbed soil, only a small percentage of water collects on the surface. Under these conditions, water that accumulates at the surface typically collects in rivulets that combine to form creeks, streams, and rivers.

Urbanization results in the loss of native soil conditions as a result of soil compaction and the creation of impervious surfaces. These changes disrupt the hydrologic cycle as shown in ***Figure 7.1***. The Impacts include increased stormwater flow rates and volumes as well as decreased groundwater recharge and, consequently, low base flows into streams.

Figure 7.1 Impacts of Urbanization on Stormwater Runoff



Urbanization, that does not include proper protection measures, can have serious negative impacts on the quality of surface water and groundwater. As land is developed, the volume of pollutants from vehicles and other human activities increase. The increase in impervious areas reduces the availability of the natural biological processes of soil to remove impurities from the water. The increased runoff flows wash pollutants from impervious areas, concentrating them in the storm sewers and transporting them downstream to receiving waters. Pollutants of concern include sediment (suspended solids), heavy metals (dissolved and particulate, such as lead, copper, zinc, and cadmium), nutrients (such as nitrogen and phosphorous), bacteria and viruses, organics (such as oil, grease, hydrocarbons, pesticides, and fertilizers), floatable trash and debris.

Managing the quality and quantity of stormwater runoff in the City Centre area will help protect streams so that they remain healthy and productive. Well planned measures can help reduce the need for costly infrastructure and stream restoration as well as provide green public amenities.

7.0 Existing & Future Servicing Issues

7.0.1 Summary of Previous Watershed Studies

Stormwater from the City Centre area flows into Bolivar Creek in the north and Quibble Creek in the south. The City's Watercourse Classification Map, shows Quibble Creek and most of its branches are of 'Class A' category ('inhabited or potentially inhabited by salmonids year-round'); Bolivar Creek is a combination of 'Class B' ('significant food/nutrient value') and 'Class A'.

The City of Surrey completed the "Quibble Creek Functional Feasibility Study" (2003), the "North Bluff Drainage and Slope Stability Assessment", (2000) and the "Quibble Creek Integrated Stormwater Management Plan" (2014), Bridgeview - North Slope (2015). Important conclusions from these studies that pertain to development and storm water management within City Centre are outlined below. These studies are based on earlier density forecasts for the City Centre area.

The City Centre Plan proposes greater levels of imperviousness and population densities than previously anticipated. This makes the recommendations for mitigation and pollution control from the earlier studies more important because the negative impact of development on the receiving waters will be greater than originally expected.

Quibble Creek Issue Functional Feasibility Study

Key points from the Quibble Creek Issue Functional Feasibility Study include:

- The on-going densification of developments in the Quibble Creek watershed is increasing its impervious surface area and contributing to increased stormwater runoff volumes and rates. These higher flow rates and volumes are impacting the receiving watercourses and their flow regimes, leading to streambed and bank modifications. In addition, an increase in imperviousness results in a decreasing the base flows and deterioration of stormwater runoff water quality to the creek. Future development within the City Centre area will increase impervious surface area by an additional 15%. This will increase both potential creek erosion and the volume of sediment entering the watershed. The watercourses are experiencing significant flows during frequent events of up to the 5-year recurrence level. This part of the flow regime has the greatest disturbance impact on aquatic habitat in the watercourses.
- Approximately 35% of the length of Quibble Creek and its tributaries do not have the standard 30m riparian corridor. Almost the full length of the City Parkway and King George Boulevard tributaries do not have a 30m riparian corridor.
- Based on biophysical inventories of Quibble Creek conducted in 1995 and 2000, contaminated sediments continue to be a critical problem in the upper reach from immediately below Fraser Highway north to the 100th Avenue culvert. As a fish-bearing water course, the Quibble Creek report concludes that it is critical to control sediment loading to the watercourse.
- The Quibble Creek Functional Feasibility Study recommends '***on-site storage; riparian (buffer zone) protection; and the addition of sediment collection units***'. In particular the study recommends that '***developers should be required to implement measures that would reduce runoff volume***' and that sediment control/water quality improvement drainage units '***should also be promoted to control the quality of stormwater discharges from new commercial and industrial developments, redevelopments and parking lots, particularly in the City Centre area***'.

North Bluff Drainage and Slope Stability Assessment

Key points from the North Bluff Drainage and Slope Stability Assessment include:

- The proposed ultimate land use for City Centre has a significant impact on volumes of runoff and peak stormwater flows. It identifies a series of storm system improvements to accommodate this additional runoff,

including the Bolivar Creek Diversion sewer which will mitigate ongoing and future erosion potential along Bolivar Creek.

Quibble Creek Integrated Stormwater Management Plan

The Quibble Creek Integrated Stormwater Management Plan (ISMP) includes the following key issues:

- Flood management of undersized storm sewers and culverts, erosion management in the stream channels, mitigation of future development impacts from increasing imperviousness in the watershed, environmental protection due to threats to riparian and stream integrity and the need to establish the long term vision for the watershed.

Bridgeview - North Slope Integrated Stormwater Management Plan

The Bridgeview - North Slope (ISMP) includes the following key issues:

- Protect and preserve green space and ecosystem sites, hubs, and corridors that support wildlife habitat
- Include water quality facilities and on-site stormwater detention.
- Stricter enforcement to prevent/reduce polluting of water courses and drainage systems by residents, businesses, and the industrial areas.

The City has implemented a number of the recommended stormwater capacity upgrades for City Centre which are described below on **Table 7.1.** This highlights the investment already expended in the area to prepare for development. The works completed to date are based on a lower level of development than the land use designations of the current City Centre Plan; however it is expected that by incorporating mitigation measures into the current plan, the completed infrastructure will be adequate to service the area.

Table 7.1 City Centre Capacity Upgrades Completed to Date

Year	Watershed	Project	Cost
2000 – 2011	Bolivar	Bolivar Creek Diversion Sewer – Bolivar Creek By-pass north of City Centre Bolivar Phase 3 Storm Trunk – 104 Avenue/City Parkway – 108 Ave/University Drive 1050mm diameter storm sewer	$2,100,000
2007	Quibble	City Centre Detention Pond at Whalley Blvd/100 Avenue	$560,000
2012	Bolivar	Trunk sewer installation servicing the area north of 108 Ave and east of 136 St	$2,200,000
2012	Quibble	Trunk sewer installation along 104 Ave from 140 St to Whalley Blvd, south along Whalley Blvd to 103 Ave and along the alignment of 103 Ave to King George Blvd.	$1,900,000
		Total	**$6,760,000**

7.1 Design Criteria & Analysis

7.1.1 City Strategy and Policy

The City Centre area servicing is aligned with existing key documents and planning processes such as the July 2008 City Centre Plan Update for Council and the ongoing associated planning process, City of Surrey Sustainability Charter, Biodiversity Conservation Strategy and the City's drainage and environmental by-laws and policies.

Objectives from these various documents that are relevant to stormwater management in the City Centre area are outlined below.

City Centre Area Plan Update

The goals listed below were taken from the City Centre Area Plan Update – Phase II, Stage 1 Results. They outline elements of sustainable rainwater management such as implementing best practices, minimizing imperviousness, increasing landscaping and green space, promoting green roofs and the use of green standards for building design and construction.

- Exemplify design excellence by incorporating compact urbanism, density and sustainability to the greatest extent possible, consistent with best practices;
- Minimize surface parking and require extensive landscaping of any surface parking areas;
- Encourage landscaping and screening over most rooftop surfaces;
- Protect and enhance the Quibble Creek Greenway;
- Provide a variety of mini-parks and mini-plazas throughout the City Centre and support the park-like feel of the Binnie Neighbourhood, Hospital District and Fraser Neighbourhood;
- King George Boulevard and University Drive will be developed as attractive planted boulevards with wide sidewalks;
- Create attractive new Greenway routes on 102 and 105A Avenues;
- Accelerate the development of existing Greenway routes to a high standard;
- Create "Green Infrastructure" by introducing accessible natural features into the City Centre;
- Reduce the effective impermeable surface area;
- Promote green roofs, for their social, economic and environmental benefits; and
- Pursue LEED or LEED-like certification for municipal buildings and establish minimum green standards for multi-family and commercial buildings.

City of Surrey Sustainability Charter

The Sustainability Charter is a commitment by the City to place the principles of social, environmental and economic sustainability as the foundation of all decisions. It is the City's over-arching policy document, which guides the actions of the City. In the absence of other specific policies, direction will be taken from the Charter.

The charter identifies actions required to implement the Vision, the Goals and the Action Framework. It reflects the areas of interest within the City's three spheres of influence: corporate operations; municipal jurisdiction; and influencing other levels of government. Under the corporate operations sphere, the sustainability charter has identified a number of actions. Those actions that are relevant to rainwater management and the City Centre area are listed below.

- EN8: Apply Sustainable Engineering Standards and Practices;
- EN9: Institutionalize Sustainable Land Use Planning & Development Practices; and
- EN12: Enhance and Protect Natural Areas, Fish Habitat and Wildlife Habitat.

Surrey Drainage Policy

The City's drainage servicing practice is contained in Storm Drainage Management Policy No. H-45. The objectives that are relevant to a Stormwater BMP Strategy for City Centre are listed below.

- Provide adequate servicing infrastructure to all newly developing areas and minimize downstream adverse impacts;
- Protect the physical integrity of watercourses/creeks;
- Minimize the detrimental impact on aquatic life and wildlife habitats along watercourses; and
- Minimize the potential for water quality impairment resulting from land development in the watersheds.

Metro Vancouver Integrated Liquid Waste Resource Management Plan

In 2010 Metro Vancouver issued the Integrated Liquid Waste Resource Management Plan. This plan outlines requirements for municipalities to minimize stormwater impacts by managing rainwater runoff at the site-level. In particular, all municipalities within Metro Vancouver are required to update their municipal utility design standards and neighbourhood design guidelines to enable on-site rainwater runoff management.

7.1.2 Current Best Practices

Low Impact Development

Local governments are increasingly adopting ordinances that allow and encourage low impact development (LID) practices. In the area of rainwater management, LID works to infiltrate stormwater on-site rather than collecting, conveying and discharging stormwater off-site. The goals of LID are to enhance overall habitat functions, reduce runoff, recharge aquifers, maintain historic in-stream flows, and reduce drainage operations and maintenance costs.

Surrey is among the leaders in environmental responsibility and good engineering design practices. As we become aware of changing practices and as our continuous improvement process identifies appropriate new minimum standards we are bound to adopt these new practices. As an example of changing current best management practices, staffs have become aware of efforts in similar cities to Surrey such as Portland. The City of Portland has been recognized as a leader in innovative and sustainable stormwater management. Located in the Pacific Northwest of the United States, it has a similar climate, density, and urbanization issues as found in the City of Surrey.

Portland developed a citywide stormwater regulatory program in 1999 to meet State and Federal regulatory requirements, which includes water quality and flow control design standards for onsite stormwater management facilities. Their program focuses on low-impact development practices, structural source control devices, and maintenance and operational best management practices (BMPs) designed to improve stormwater quantity and quality.

Stormwater that is generated from private property must be managed on private property, in privately maintained facilities. Total onsite infiltration is required with vegetated infiltration facilities unless a technical analysis proves that it is not feasible due to high groundwater, poor infiltration rates (less than 2 in/hr), steep slopes, contaminated soils or space constraints. Stormwater that is generated from public property must be managed on public property, in publicly maintained facilities. In 2005 the City of Portland had approximately 9,000 public underground infiltration systems to discharge stormwater runoff from publicly owned streets.

Where complete onsite infiltration is not feasible, vegetated onsite retention/detention facilities are required to the maximum extent possible. Flow control for any stormwater discharge leaving the site must be sufficient to maintain peak flow rates at their pre-development levels for the 2-year, 5-year, and 10-year, 24-hour runoff events. For redevelopment projects, pre-development condition is defined as undeveloped land.

The Portland example demonstrates that infiltration in the downtown environment is feasible. While Portland was required by U.S. law to implement the measures, Surrey has the opportunity to implement measures to achieve our sustainability objectives voluntarily, in a professional and environmentally sound way as we move forward.

7.1.3 City Centre Objectives

The objectives of the stormwater servicing of the City Centre Plan is based on the Land Use Plan, City of Surrey Sustainability Charter, environmental and hydraulic assessments of the City Centre watersheds, the Quibble Creek and Bridgeview - North Slope ISMP, and low impact development and best practices. More specifically, the following stormwater objectives are as follows.

1. Adequately service the area to protect life and property;
2. Mitigate the adverse impacts of urban runoff water quality on watercourses;
3. Mitigate the adverse impacts of peak flows and velocities in the watercourses; and
4. Protect the riparian habitat and support the aquatic life along the watercourses.

Table 7.2 outlines strategies and performance targets that would enable the City of Surrey to meet the objectives outlined above.

Table 7.2 Stormwater Strategy and Performance Targets for City Centre Area

Objective	Strategy	Performance Target
Adequately service the area to protect life and property	Ensure the drainage system is designed according to the City of Surrey Engineering Department Design Criteria Manual.	As outlined in the Design Criteria Manual. Design flows for the 5 year to be in pipe and safe conveyance of 100 year.
Mitigate the adverse impacts of urban runoff water quality on watercourses	Control the flow of pollutants from the larger sources (construction sites and motor vehicles),	Total Suspended Solids (TSS) < 25 mg/litre
Mitigate the adverse impacts of flows and velocities in the watercourses	Control volume and rate of flow from frequent rainfall events and ensure sufficient base flows in streams.	Volume: Retain 50% of the 2 year storm Flow Rate: Reduce post-development discharge rate to pre-development discharge rate for the 2, 5 and 10 year 24 hour storm.
Protect the riparian habitat and support the aquatic life along the watercourses	Stream corridors are protected by setting minimum stream setbacks.	30 metre riparian corridor (e.g. 30 metres from top of bank on either side of the stream) is protected along the entire length of all watercourses.

7.2 Servicing Options & Proposed System

7.2.1 Options for Managing Stormwater

The design criteria manual outlines the basic storm drainage infrastructure required to provide Surrey residents with a reasonable level of service and safety. All development in City Centre is required to apply good engineering practices in order to meet or exceed the standards set out in the design criteria. By designing City infrastructure to the Design Criteria standards, we meet the first servicing objective to adequately service the area protecting life and property

To meet the next two objectives the City investigated several servicing options to determine which are the most cost effective and provide the desired results

Three options were evaluated in detail to determine their effectiveness for servicing City Centre:

1) **Diversion:**
   - Diverting stormwater away from sensitive tributaries and directly discharges it into the nearest river.
2) **Community Infiltration Facility:**
   - Collect runoff from a catchment area and gradually infiltrates it into the ground to recharge base flows at a centralized facility.
3) **On-Site BMPs:**
   - Application of BMPs on each site to capture stormwater directly and infiltrate it into the ground.

7.2.1.1 Diversion

The objective of a diversion sewer is to convey stormwater away from sensitive tributaries and directly discharge it into the nearest river. For the northern portion of City Centre that flows into Bolivar Creek the additional stormwater volume will need to be diverted into the Fraser River. This diversion may follow a similar alignment to the diversion sewer detailed in the North Bluff Drainage and Slope Stability Assessment report and would be approximately 2.4 km in length. The estimated cost for the Bolivar Diversion was approximately $2.5 Million.

For the southern portion of City Centre that flows into Quibble Creek the City has indicated that the three tributaries to Quibble Creek cannot accept increased flows and volume. Therefore the nearest outlet for this diversion would be the Serpentine River at 156 Street and 68 Avenue and the diversion sewer would have to be approximately 7.6 km in length and approximately $7.0 Million

These diversions do not allow for groundwater recharge and result in a significant modification to the natural flow regime of the receiving creeks which long term would be noticeable as a possible reduction of dry weather base flows. Although these diversion options would have no on-site requirements for developers, they would not sufficiently preserve Quibble and Bolivar Creeks. This option fails to meet the environmental and financial objectives.

7.2.1.2 Community Infiltration Facility

Community infiltration facilities require a large amount of land in order to store the captured volume from runoff and slowly re-introduce it back into the ground. While this option is more land-intensive, it does eliminate some of the concerns of maintaining many separate on-lot and on-street underground infiltration facilities. However, a community infiltration facility for the City Centre Area would need to be over 50 hectares in size. While the infiltration would provide a good approach to address some of the water quality objectives, due to the lack of available land, a large community infiltration facility is not a viable solution as it costs significantly more compared to the third alternative below.

7.2.1.3 On-Site BMP

The objective of best management practices (BMP) is to provide measures, on each lot, that will mimic the natural rainfall runoff response of the site prior to development. By making the site behave in a manner similar to pre-development, the impact of development is reduced, thereby protecting downstream properties, infrastructure, and natural resources from the increases in stormwater runoff flow rates, volumes and pollution that result from development.

Detention is a BMP that helps control flow rates by storing excess volume and releasing it over time. In the past, flow control efforts often relied solely on detention facilities such as ponds, tanks, or vaults that control peak flow rates. These facilities, however, allow the duration of high flows in creek systems to increase as the stored volume is released, causing the potential for increased erosion downstream. For example, after development with detention, the magnitude of the 2-year peak flow rate may not increase, but the amount of time (duration) that the flow rate occurs will increase.
This highlights the importance of designing BMPs with a system approach rather than as individual components.

Combining systems that can have both storage and infiltration or evapotranspiration such as pervious pavement, eco-roofs, planters, swales, and other surface vegetated facilities, lower the overall runoff volume and reduce the duration and frequency of the peak flow rate.

Stream systems that require erosion protection, such as Quibble and Bolivar Creeks, benefit from the use of the combination of retention systems, infiltration and evaporating stormwater. Vegetated retention systems recharge groundwater that serves as the base flow for streams during the dry season. Where retention systems cannot be used, detention systems that control the duration of the geomorphically significant flow (i.e., flow capable of moving sediment) must be used. Such detention systems lower release rates and must be designed to protect the stream channel.

Time of concentration (the time it takes rainfall to accumulate and run off a site) is an important factor in hydrologic impacts of development. The resistance of soils, natural topography and vegetation slow runoff from undeveloped sites. Flow rates may be controlled using detention, but when they are combined quickly in fast-flowing conveyance pipes, the downstream effect will still be increased in-stream flow rates and volumes. Breaking flow patterns up into surface retention systems helps increase a site's time of concentration and lessens downstream impacts.

In addition to controlling flow, vegetation may be one of the most cost effective and ecologically efficient means available to improve water quality. Vegetated facilities filter stormwater, removing pollutants as the water flows through the vegetation and soil. Vegetation within riparian areas also shades water courses, which lowers water temperature; captures and absorbs water, which reduces peak flows; stabilizes soils and banks; provides wildlife habitat; and improves the aesthetic quality of the area.

A BMP Strategy for the City Centre Area should ensure that development protects the riparian area of stream channels and that post-development rainwater runoff:

- Controls the flows to the receiving conveyance facilities and water bodies to their natural capacity;
- protects stream banks and stream channels from erosion;
- protect the quality of downstream water bodies; and
- prevents upstream or downstream flooding.

In addition to achieving all of the objectives outlined above, a BMP strategy for the City Centre area can support a functional and attractive public realm.

Managing stormwater involves a variety of measures from on-site BMPs to area-wide storm sewer infrastructure.

7.2.2 Addressing Water Quality through BMPs

Changes in land use, loss of natural bio-filtration capacity, increases in impervious area, and pollutant laden runoff associated with urban development all contribute to water quality which impacts fish and human and fish habitat. The area studies have concluded that protecting Quibble Creek from contaminated sediments is a significant issue. Land development guidelines recommend the treatment of all stormwater runoff. It is recommended that Surrey treat the runoff from City Centre area before discharging to Quibble and Bolivar Creeks. Water quality is now a requirement that must be incorporated into all design practices.

Water Quality BMPs are physical, structural or management practices that reduce or prevent water quality degradation. Many of these are the same as, or similar to BMPs used for runoff volume reduction and rate control, but have ancillary benefits for water quality. For example, infiltrating stormwater on-site will also benefit water quality.

Contaminants within stormwater come from a variety of sources:

- Natural sources;
- Roadways and parking areas; and
- Private property.

A variety of measures are needed to adequately protect water quality, due to the range of sources and contaminants. The measures that are recommended for City Centre are listed below:

- Erosion and Sediment Control By-Law (already in effect) with enforcement;
- Require runoff from underground parking to drain to the sanitary sewer (already in effect)
- Optimised O&M practices such as street sweeping, catch basin cleaning, public education and spill reporting and response.
- Water quality treatment for all street runoff and surface parking areas (proposed new measure).

There are a variety of water quality treatment options which can be generally grouped in the following categories:

- Vegetated swales and strips;
- Dry basins;
- Wet basins;
- Constructed wetlands;
- Vortex separators;
- Oil/water separators;
- Inert media filters;
- Sorptive media filters;
- Drain inlet devices; and
- Infiltration systems.

The BC Water Quality Criteria for Aquatic Life recommends a maximum total suspended solid (TSS) of 25 mg/L. Runoff from vehicle areas (roadways, parking lots) and construction sites will be treated to meet the BC Water Quality Criteria for Aquatic Life (TSS < 25 mg/litre).

Based on land constraints within the City Centre area, we investigated the feasibility of treating road runoff by having an engineered treatment system (such as a vortex separator) upstream of each location where stormwater runoff is discharged to a creek. Within City Centre we identified seven locations where the majority of the stormwater is discharged to Bolivar or Quibble Creek (as shown in ***Figure 7.2***).

By placing an engineered treatment system near each of these discharge points the stormwater runoff within the City Centre area will meet the given performance target. The added benefit is that all the stormwater runoff, and not just road runoff, will be treated.

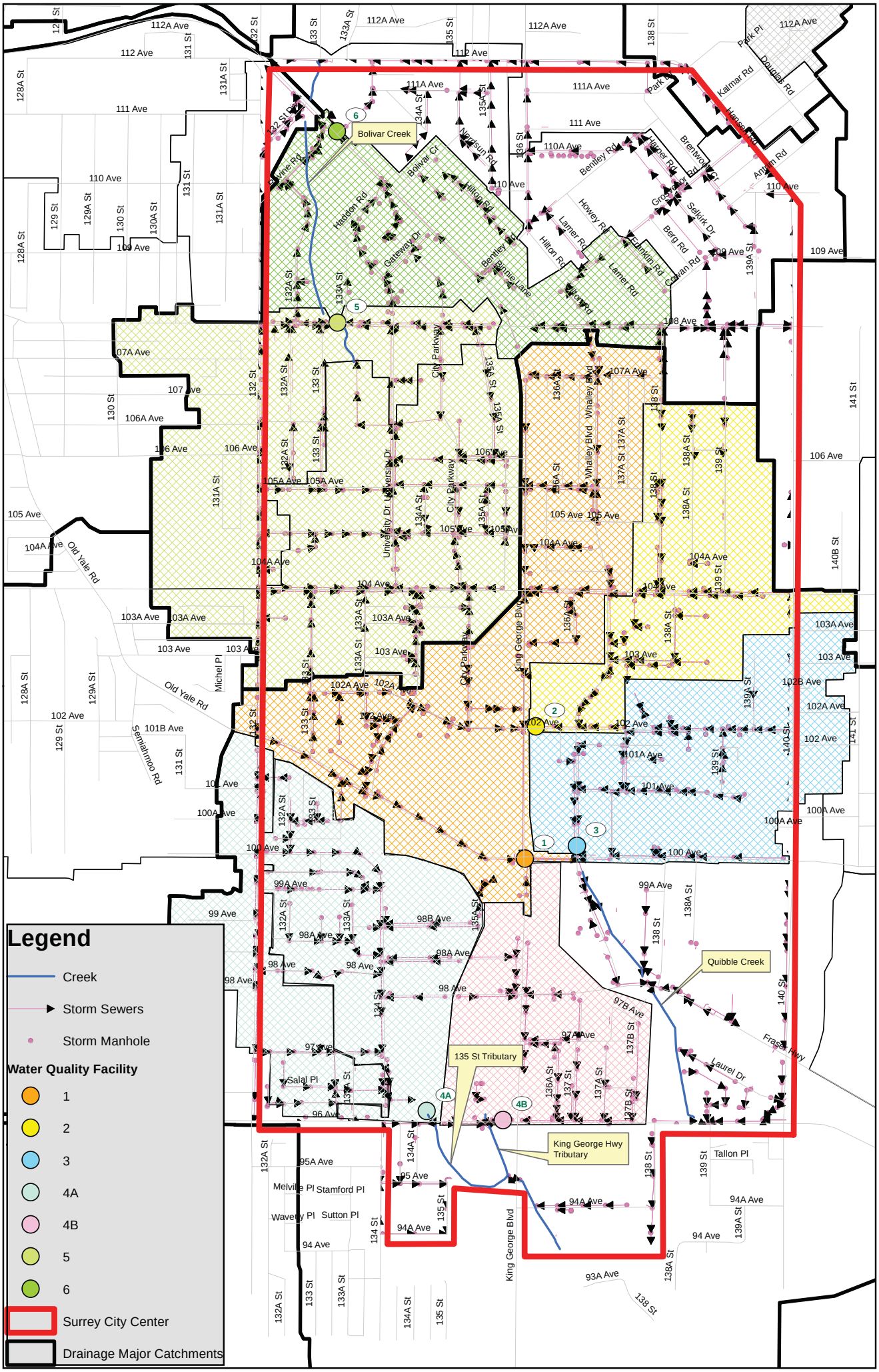


Figure 7.2 Potential Locations for Water Quality Treatment Facilities

7.2.3 Addressing Volume and Flow Control through BMPs

As outlined in ***Table 7.2***, it is recommended that Surrey retains 50% of the 2 year storm and control post development flows to pre-development levels. The most effective way to control runoff is through on-site BMPs such as rain gardens, green roofs and pervious pavement. The 24-hour 2-year rainfall amount for North Surrey is 64.6 mm. Since the objective is to retain 50% of the 2 year storm, 32.3 mm of rainfall must be retained on-site.

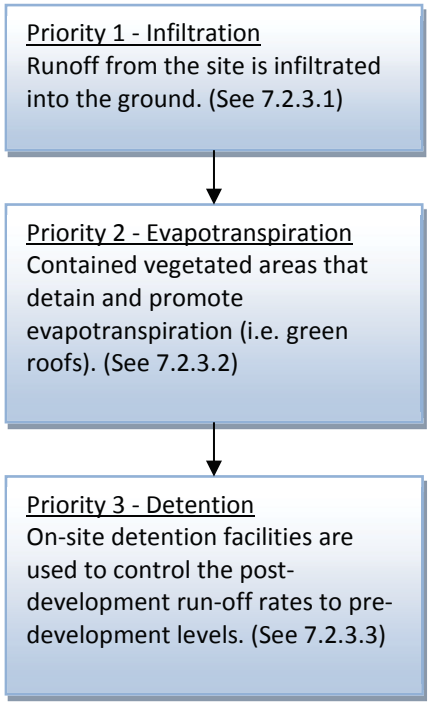
Community detention ponds are complimentary treatment processes for an effective BMP strategy. They provide additional water quality and detention benefits. However, in high density areas like City Centre it is challenging to implement because of high construction costs and the lack of available land. A small community pond has been constructed at the headwaters of Quibble Creek. Additional water quality and flow control is needed to protect this salmon bearing stream.

Controlling stormwater runoff on-site will reduce the degradation of Bolivar Quibble and the downstream Bear, creeks. In order to be effective the BMPs must retain 50% of the 2 year storm and detain post development flows to pre-development levels.

A successful BMP strategy must be simple to implement. The following BMP strategy for on-site stormwater management for the City Centre Area will provide the desired mitigation and is designed to be built into the on-site landscaping that normally is required of new development as part of planning for an aesthetically pleasing and healthy urban environment.

The following flow chart **Figure 7.3** outlines a staged approach based on various landscaping options that can be followed by developers to cost effectively meet the BMP requirements:

Figure 7.3 BMP Implementation



The objective is for sites to use infiltration techniques wherever possible, but where that is not feasible, sites may use evapotranspiration techniques. If both infiltration and evapotranspiration techniques are not sufficient, a site will be required to implement detention facilities. ***Appendix C*** outlines a number of BMPs and whether they are suitable for infiltration, evapotranspiration or detention.

A spreadsheet style worksheet has been prepared for Developers to confirm that they are meeting the landscape values or on-site detention requirements – see **Appendix C**. Each Developer is required to submit this information with their development application.

Additionally, a Stormwater Management Typologies and Strategies for developments in Surrey City Centre and other emerging urban neighbourhoods has been prepared for the City by van der Zalm + associates Inc. and is also included in **Appendix C** as reference material.

7.2.3.1 Priority 1 – Infiltration

Runoff can be infiltrated through absorbent landscaped areas, infiltration rain gardens, infiltration basins/ trenches, soakaway manholes or pervious pavements. Provide 0.5 cubic metres of free draining topsoil for every square metres of impervious area. Place on native soil to provide infiltration. Direct runoff to the landscaped area in an acceptable manner to allow flows to infiltrate. Where there are insufficient native soil areas for the placement of a reasonable depth of topsoil to meet the above requirement, treat the remainder of the site with detention.

Required Volume of Infiltration Material (m^3) = (site area in m^2) x 0.5 metres

7.2.3.2 Priority 2 – Evapotranspiration

Runoff from areas that cannot be infiltrated into the ground due to site constraints such as underground parking requirements can be controlled through vegetated areas that use detention and evapotranspiration. These vegetated areas must have at least 75 mm of growing medium and be designed to reduce the volume of the 2 year storm by at least 50%. For each square metre of landscaped surface on top of an impervious surface such as a parkade or rooftop, the site must have 0.02 m^3 of stormwater storage. Examples of vegetated areas include green roofs and planters.

Required storage (m^3) = (landscaped area with no infiltration in m^2) x 0.02 metres

Rainwater that is stored on-site should be discharged at a rate that mimics the natural infiltration function of providing low flows to streams. If we assume that under natural conditions the soil had an infiltration rate of 1mm/hr, then the discharge rate should be 3 L/sec/ha. The design of the system is intended to be allowed to drain over 48 hours. Examples of using on-site landscaping to manage stormwater are illustrated in ***Figure 7.4***.

Figure 7.4 Examples of Using On-Site Landscaping to Manage Stormwater

7.2.3.3 Priority 3 – Detention

Runoff from areas that cannot be infiltrated or treated through evapotranspiration will need to be detained such that the post development flow equals the pre development flow. Pre-development conditions should be assumed to be vegetated landscape with a runoff coefficient (C) of 0.20.

For each square metre of bare plain impervious surface, from which the runoff is not infiltrated, the site must have 0.05 m^3 of stormwater storage.

Required storage (m^3) = (impervious surface area in m^2) x 0.05 metres

Detention facility design details are outlined in ***Section 7.2.3.2*** and ***Figure 7.2.***

7.2.3.4 On-Site BMP Scenarios

To understand the implications of implementing the on-site BMP requirements we have developed various scenarios for different development types. ***Figure 7.5*** shows a schematic of the proposed scenarios.

Scenario 1: Townhouse

A portion of City Centre may consist of medium density housing such as townhouses. To assess using BMPs within this setting we have assumed a 9 m x 21 m lot with 80% imperviousness. The pervious areas should be required to contain sufficient soil/landscaping to detain the 32 mm that falls upon it. The driveway and outdoor patio could be constructed of pervious or impervious pavement. They would have an infiltration facility (gravel trench or plastic retention chambers) below them. The roof runoff is directed to the driveway and patio and allowed to infiltrate below. There would be an overflow to the standard drainage system.

It is important to note that although roof runoff is not contaminant free it is relatively clean in comparison to street runoff. Given that there are no highly sensitive groundwater sources in proximity to City Centre, it should be acceptable to infiltrate roof runoff without significant treatment. Some form of basic treatment such as a screen will prevent blockages within the infiltration facility, improve its performance and prolong its service life.

Scenario 2: High-Rise Residential/Commercial

A significant portion of City Centre will consist of high-rise residential and commercial buildings. To assess using BMPs within this setting we have assumed a 30 m x 30 m lot with 80% imperviousness. The pervious areas contain sufficient soil/landscaping to detain the 32 mm that falls upon it. The runoff from the impervious areas (roof) could be dealt with in the following ways.

- Option A: A green roof covers the entire roof top which is designed to retain a minimum of 32 mm;
- Option B: The runoff from the roof is directed to the pervious pavers at grade with an infiltration basin. The infiltration basin must contain approximately 500 mm of soil to provide sufficient storage; or
- Option C: Provide 36 m^3 of detention on-site ((30 m x 30 m x 0.8) x 0.05m)).

A summary of the proposed on-site BMP requirements and how they would look in a high-rise development setting is provided in ***Appendix C***.

7.2.4 Riparian Habitat Protection

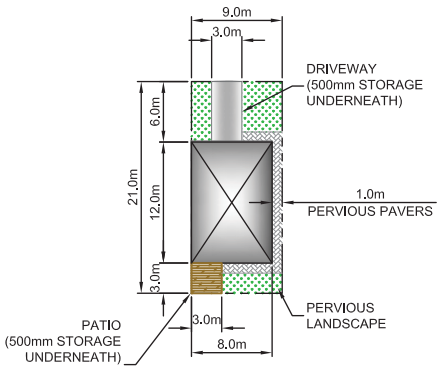
The fourth City Centre servicing objective is the protection of riparian habitat and support of aquatic life along the watercourses. By addressing the second and third objectives there is a reduced impact on the water courses. Maintaining or improving water quality will ensure that fish are able to survive. Control of flows so that that erosion occurs at a natural rate and can potentially be managed for the protection of property and of the riparian areas.

The riparian area adjacent to creeks requires protection from loss due to development and due to human activity. The City is developing measures and policies to address this concern. The .Riparian Area By-law is being prepared by the City to clarify how to best protect these areas.

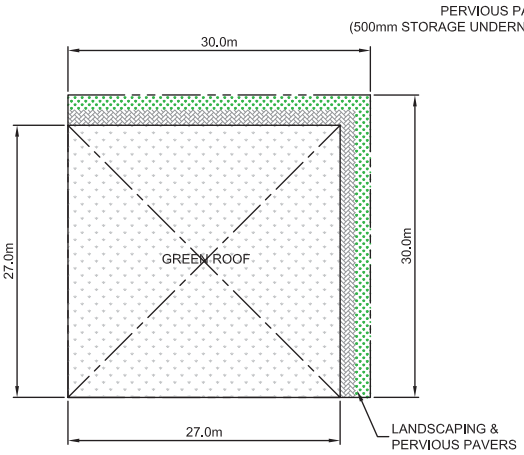
7.2.5 Recommended Servicing System

The City has constructed infrastructure works to address the safe conveyance for the 100 year event throughout the City Centre area, therefore, the following servicing system is recommended:

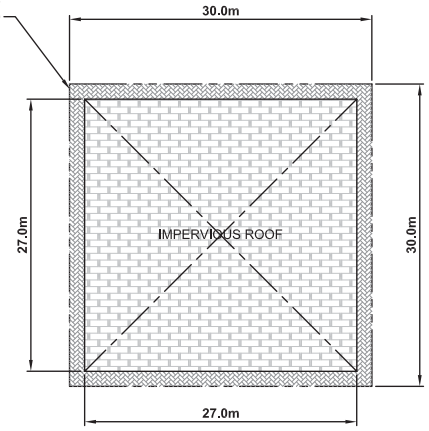
- All sites to meet the basic servicing requirements of the Design Criteria Manual
- On-site to include BMPs to control runoff volume and flow (2 year event);
- Developer's Architect to design the on-site BMPs as part of the site development process to ensure early incorporation of the works into the site design.
- The City to design and have constructed water quality facilities to remove solids and improve water quality from the stormwater runoff before discharging into Quibble and Bolivar Creeks; and
- Development to follow or exceed the Riparian Area By-law requirements.



SCENARIO #1 - TOWNHOUSE



SCENARIO #2A- HIGHRISE



SCENARIO #2B - HIGHRISE

DO NOT SCALE THIS DOCUMENT.
ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS.

I/R	YY/MM/DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	ENG	IDR	APP
A								

AECOM

ON-SITE STORMWATER DETENTION
CITY CENTRE AREA

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
106544	Figure 7.5	A

7.3 Infrastructure Costs and 10-Year Servicing Plan

The components of the servicing strategy for City Centre are:

- Treat road runoff before discharging it into Quibble Creek and Bolivar Creek and tributaries;
- Require on-site BMPs, as outlined in Section 7.2.3, which control the volume and rate of runoff from individual sites;
- Establish a 30 metre setback from top of bank for all development adjacent to Quibble Creek and Bolivar Creek and tributaries; and
- Implement the green street designs as provided in the Transportation Part of this Plan.

7.3.1 Capital Costs

Outlined below are the capital costs for implementing the Off-site and On-site BMP measures. These costs do not include maintenance costs.

Proposed New Measure #1 - Water quality treatment for all on-street runoff

The recommended approach to treating road runoff within the City Centre area is to place large vortex separators at the downstream end of each sub-catchment, before the water is discharged to Bolivar Creek or Quibble Creek. We identified seven sub-catchments which capture over 95% of the runoff from the City Centre Area. The estimated cost of purchasing and installing seven vortex separators, which are sized to meet the BC Water Quality Criteria for Aquatic Life, is $1.7 million. It is recommended that the devices be installed within the next ten years and that the City budget for annual inspection and cleaning at each of the installation sites.

The vortex separators are development cost charge (DCC) eligible infrastructure because they service catchment areas greater than 20 hectares in size.

Proposed New Measure #2 – On-site BMPs

As shown in ***Figure 7.5*** we have presented three scenarios for implementing on-site BMPs. The capital cost for developments with the desired BMPs for each of the scenarios is presented below. The cost estimates listed below include the base paving, roofing and landscaping costs. The life cycle costs are not shown and no adjustment are included for benefits unrelated to drainage and water quality.

- *Option 1: Townhouse* $13,000
- *Option 2A: High-rise with green roof* $120,000
- *Option 2B: High-rise with impermeable roof* $50,000

The cost estimate for Option 1 includes the cost of pervious pavement, an Infiltration basin with associated catch basin and observation well, and additional soil for landscaping. If the resident chose to install a chamber rather than pervious pavement with an infiltration basin then the cost would also be approximately $13,000.

The cost estimate for Option 2A includes the cost of a green roof, pervious pavers and additional soil for landscaping. It is important to note that the cost of a green roof doesn't consider other the benefits of a green roof; namely its use as an amenity space, a reduction in heating and air conditioning needs, an extension in the life of the roof, and its aesthetic value. In some cases, an intensive green roof may be required for amenity space, resulting in little or no additional cost to provide the necessary stormwater benefits.

The cost estimate for Option 2B includes the cost of pervious pavement and infiltration basins with associated catch basins and observation wells.

7.3.2 10 Year Servicing Plan

The City has already invested almost $7,000,000 over the past 12 years in upgrading the existing drainage system servicing the City Centre area (**Table 7.1**).

The following four local system upgrades projects (Table 7.3) have yet to be constructed to support the ultimate development, and are included in the 2014 – 2023 10 Year Servicing Plan for future localized system upgrades. These projects are in the 10 year plan because larger capacity is required for servicing or because the pipes require replacement. These are not eligible for DCC rebates as they do not service a catchment of 20Ha or greater. .

Table 7.3 Local system upgrades

10 Year Plan ID	Location	Length (m)	Prop. Dia. (mm)	Total Cost	DCC Amount
6412	140St: 105-105A Ave	172	450 & 600	$119,200	$11,920
11638	140 St: 104 – 106 Ave			$250,000	-
11662	Grosvenor Rd-111A Ave: 136 St-Brentwood Cr			$355,753	-
11640	132 St: 104 – 108 Ave			$592,843	-

To complete the list of projects for the stormwater servicing strategy, it is recommended that the City include the design and installation of the six water quality systems in the current 10 Year Servicing Plan (See Table 7.4).

Table 7.4 Water Quality Treatment Locations

Site	Location	Watershed	Total Cost	DCC Amount
1	Old Yale Rd at King George Blvd	Quibble	$245,000	$245,000
2	102 Ave at King George Blvd	Quibble	$245,000	$245,000
3	100 Ave at Whalley Blvd	Quibble	$245,000	$245,000
4A	96 Ave at 135 St	Quibble	$245,000	$245,000
4B	96 Ave at King George Blvd	Quibble	$245,000	$245,000
5	108 Ave at 133A St	Bolivar	$245,000	$245,000
6	King George Blvd at Ravine Rd	Bolivar	$245,000	$245,000

The City has advanced the area servicing works, and is currently completing the review and design of the water quality facilities, the works were completed using city wide development cost charge (DCC) funding. Developers will only be responsible to complete local servicing that is required to service their development if it precedes routine replacement or the natural progression of building that would have upgraded the existing pipes to the current design criteria.

The trunk drainage servicing for the area is fully funded through general DCC and once the water quality systems are completed, the area trunk servicing will be substantially complete.

APPENDIX C: STORMWATER DETAILS

- On-Site BMP Details
- Surrey City Centre On-Site Stormwater Management Requirements
- Worksheet for Landscaping and On-Site Detention Requirements
- Stormwater Management Typologies and Strategies

C1. On-Site BMP Details

BMP	Priority 1 Infiltration	Priority 2 Evapo-transpiration	Priority 3 Detention	Reference
Absorbent Landscape	X	X		1,2
Infiltration Swale System	X			1,2
Infiltration Rain Garden	X	X		1,2
Pervious Paving	X			1,2
Green Roof		X	X	1,2
Infiltration (or Soakage) Trench	X			1,2
Soakaway Manhole/Catch Basins	X			1,2
Detention Vault			X	2
Planters – open-bottomed with infiltration	X	X		1
Planters – closed (no infiltration)		X	X	1
Rainwater Harvesting	X			2
Rooftop Detention			X	2

1. GVS&DD Stormwater Source Control Design Guidelines 2005
2. MMCDA Green Design Guideline Manual 2005

SURREY CITY CENTRE

On-site Stormwater Management Requirements

Step 1

Infiltrate the stormwater run-off to the maximum extent possible.

For each square metre of impervious* surface area, there must be 0.5 m3 of infiltration material (i.e. top soil, gravel trench etc.).

*Please note that for an area to be considered pervious it must be in its natural state or have sucient top-soil and vegetated cover to mimic pre-development inltration rates.

If you are not able to infiltrate the entire site please proceed to Step 2.

Step 2

Use landscaped areas (including green roofs) to store and reduce run-off through evapotranspiration.

Proceed to Step 3 to determine storage requirements.

Step 3

Provide storage for run-off that is not addressed through infiltration or evapotranspiration.

For each square metre of landscaped surface, from which the run-off is not infiltrated, the site must have 0.02 m3 of stormwater storage.

For each square metre of impervious surface, from which the run-off is not infiltrated, the site must have 0.05 m3 of stormwater storage.

Scenario #1

Office based complex – 1 ha (i.e. 125 m x 80 m)

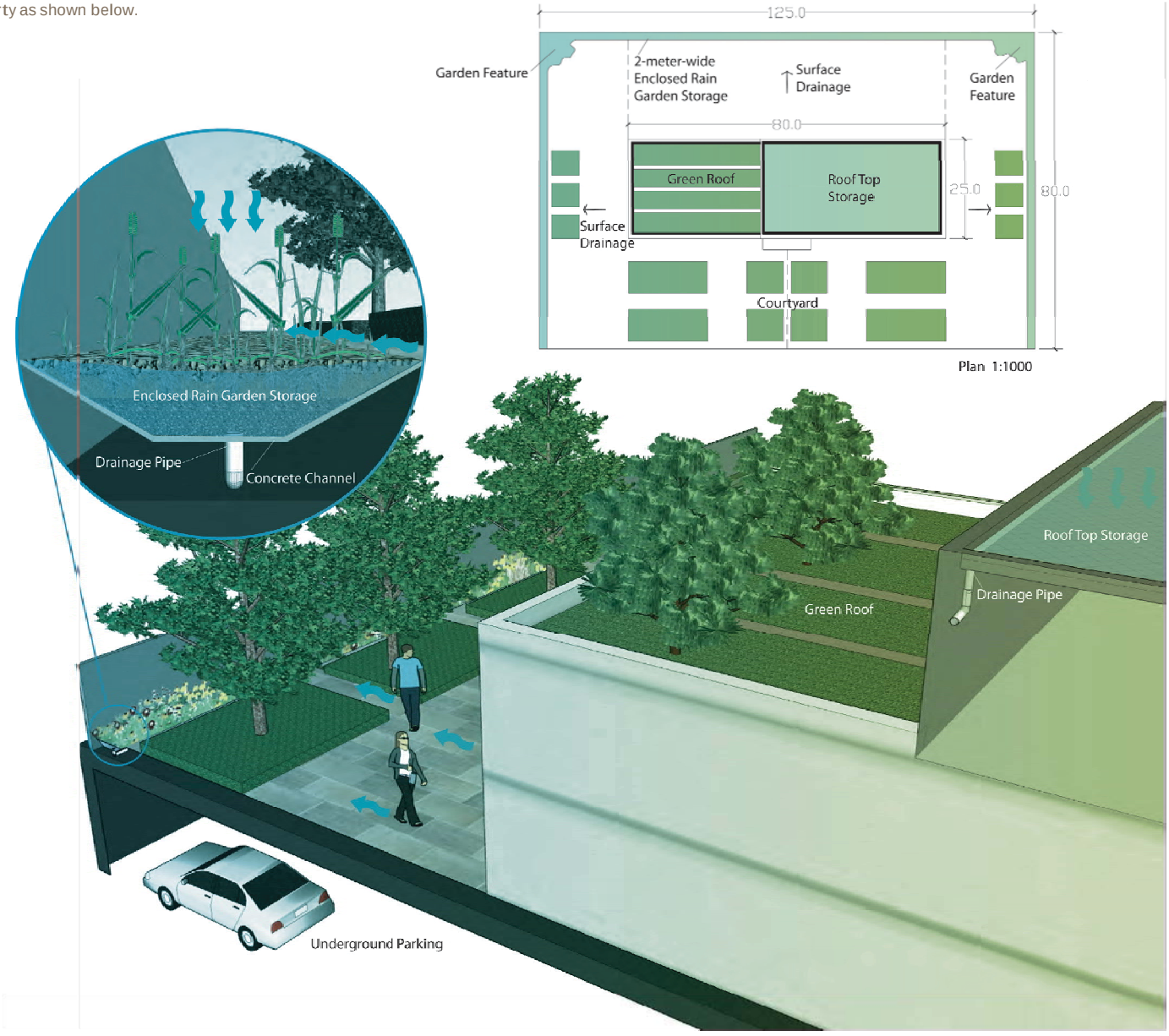
- No infiltration possible due to underground parking
- 25% of site is covered with planters/green roof
- 75% of site is impervious

Volume (V) of stormwater storage required:

V=10,000 m2 *25% *0.02 m3 +10,000 m2*75%*0.05 m3

V=50m3 +375m3=425 m3

Water could be stored in gravel based planters bordering one side of the property as shown below.



Surrey City Centre Development Mitigation

	Not to be used for areas outside the City Centre GLUP	Input		
A	Total Site Area	6132	m^2	
U	Protected Undisturbed Area	0	m^2	0%
D	Total Disturbed Area Calculated	6132	m^2	100%
P_l	Pervious Landscaping (over native soil)	1200	m^2	20%
S_d	*Topsoil Depth In Pervious Landscaping (over native soil)*	550	mm	Max 450mm unless designed.
P_p	Pervious Surfaces (over native soil)	134	m^2	2%
I_l	Landscaping (min 75 mm growing media over impervious)	584	m^2	10%
I_c	Impervious (no landscaping)	4214	m^2	69%

Instructions: Provide the values for the cells highlighted in Green

Summary of Topsoil and Detention Requirements

Stage 1	**Infiltration Provided**		
T_p	Topsoil Provided (S_d x P_l)	660	m^3
I_t	Area of impervious surface treated with topsoil (T_p/0.5)	1320	m^2
I_r	Area of impervious surface not mitigated with topsoil (I_c-I_t)	2894	m^2
Stage 2	**Detention Required**		
D_l	Detention for Landscape over Impervious (0.02 x I_l)	12	m^3
D_c	Detention for Untreated Impervious areas (0.05 x I_t)	**145**	m^3
Dt	Total Detention required (D_l + D_c)	156	m^3
	Allowable Discharge rate is 3 l/s/ha	1.8	l/s
Stage 3	**Detention Accomplished**		
Dt	Total Detention required (D_l + D_c)	156	m^3
Sde	Average soil depth in landscape over impervious*	0.3	m
Sd	Soil detention over impervious (avg. depth * 0.1 * area)**	**18**	**m^3**
D%	Percentage of Impervious (non landscape) availible for mitigation measures***	66	%
Di	Area of opportunuties for detention over impervious***	2781	m2
Md	Average depth of materials ****	0.05	m
Dit	Engineered detention over impervious	**139**	**m^3**
Stage 4	**Deficit Calculations**		
Dtot	Total Detention provided over impervious	157	m^3
Ddef	**Detention deficit*****	**0**	**m^3**

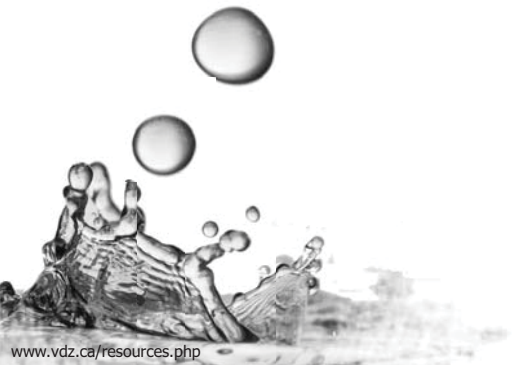
* while 75mm is minimum, average depth by BCLNA standards will be greater, and can likely average 300mm.
** assumes 1mm detention per 10mm of soil.
*** areas where slab drains could be held high (ie/ 25mm or 50mm), use of drainage mat, additional crushed gravels for detention.
Number does not necessarily equal total non-landscaped impervious, due to potential strucutural cost implications, but could, in theory.
**** depth of detention over impervious
***** goal is that this number reaches ZERO, otherwise alternatives to be undertaken, including on site tanking.

Note: this spreadsheet is for evaluation only, it requires the addition of a site figure showing the proposed layout, sections and landscape details before it can be used as an engineering design tool. The spreadsheet is only to be used for City Centre as an aid for design. It is not meant as a design standard or a submission item. It is assumed that anyone using this spreadsheet understands its benefits and limitations of the spreadsheet and is not relying on the above numbers as proof for a servicing strategy. As of this date the values in this spreadsheet have not been confirmed or approved for use and are only provided for information. This spreadsheet is a a work in progress

Storm Water Management Typologies and Strategies

For Developments in Surrey City Centre and Emerging Urban Neighbourhoods

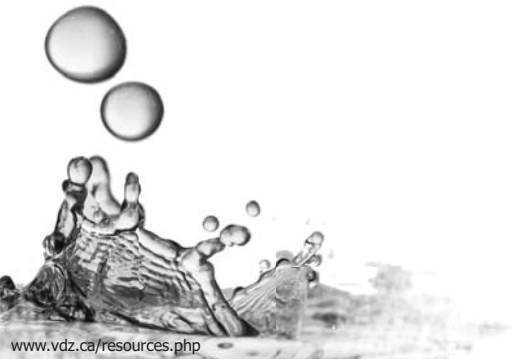
contents



www.vdz.ca/resources.php

part one: understanding urban runoff

Understanding of the water cycle has developed over the past few decades. Water quality in measured in runoff volumes, pollutant levels, and discharge rates had allowed municipalities and governments to better understand the effects that storm water has on our environments.



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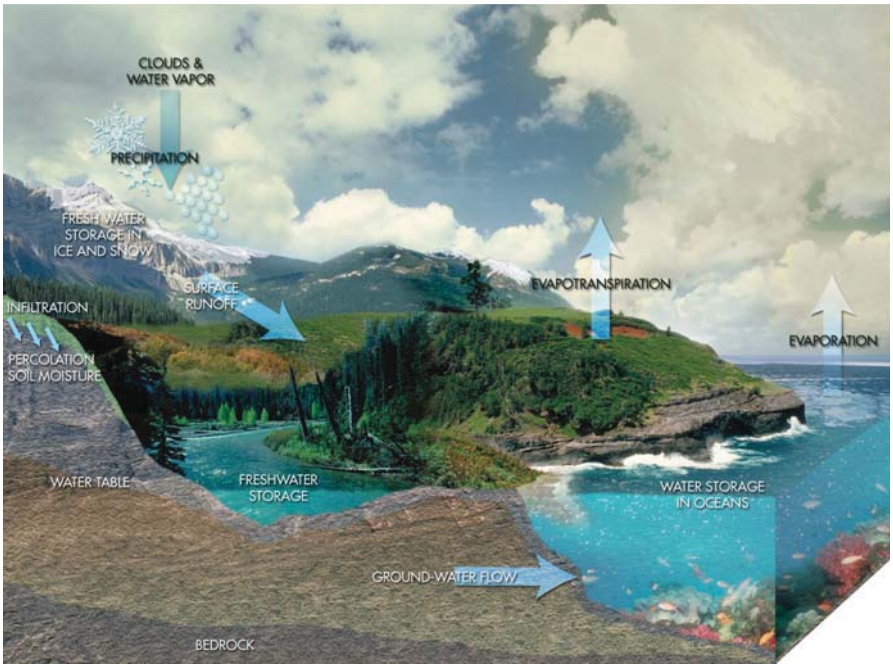

part one: understanding urban runoff

Past to Present

Traditional design and planning in urban environments relied heavily on infrastructure with little or no on-site storm infiltration.

This created stresses on storm water systems and degraded downstream natural environments from increased pollutant runoff and volumes of water.

The high amounts of darkly paved surfaces in urban areas also dramatically increased the heat in their environments due to the low reflective properties, causing **"the heat island effect"**.

The increased heat and pollutant concentration in urban areas also resulted in an increased potential for smog and poor air quality through evapotranspiration.

www.vdz.ca/resources.php

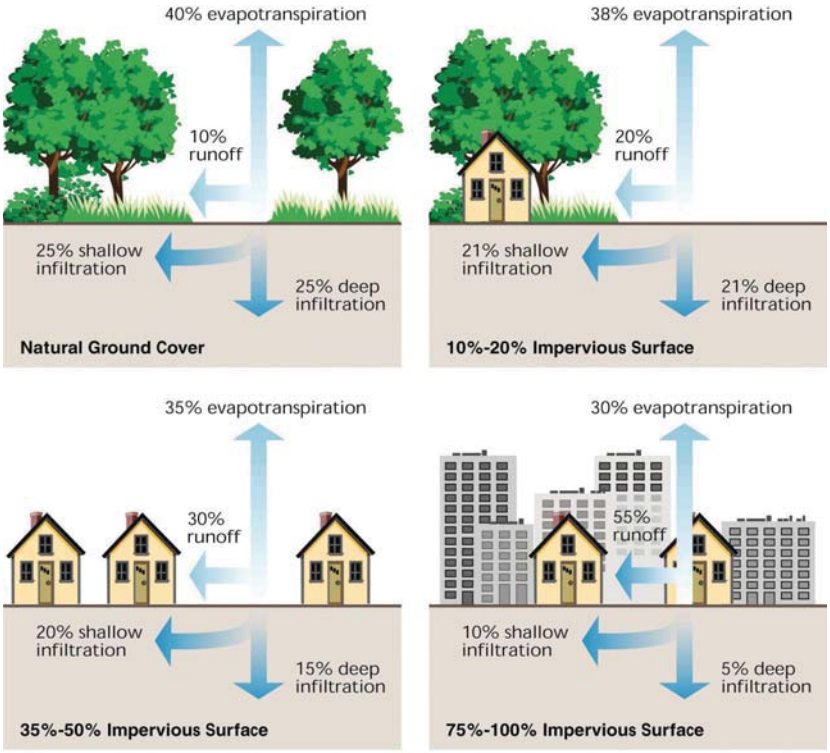

Fig. 3.21 -- Relationship between impervious cover and surface runoff. Impervious cover in a watershed results in increased surface runoff. As little as 10 percent impervious cover in a watershed can result in stream degradation.
In Stream Corridor Restoration: Principles, Processes, and Practices (10/98).
By the Federal Interagency Stream Restoration Working Group (FISRWG) (15 Federal agencies of the U.S.)

part one: understanding urban runoff

Present and Future

Traditional design of urban storm water management is based on medium to maximum rain events anticipated for areas ranging anywhere from 2 to 200 year storm events. Designers have recognized the benefits of increasing site permeability and infiltration to manage day-to-day rainfall to decrease stresses on storm systems and extended environments. The present and future focus of stormwater design involves management of the majority (or all) storm water within a site.

Benefits of increased site permeability and infiltration design can include:

- Improved site aesthetic with additional soft landscaping and textured surfaces
- Decreased runoff rates of storm that lead to -
- Increased removal of site pollutants and suspended solids through the natural processes of soils and -
- Increased concentration time of site storm water for groundwater recharge or plant absorption

Several methods of rating initiatives to remediate storm water management include:

- LEED Sustainable Sites credits and Water Efficiency credits
- LID (Low Impact Development) measures • Green Globes • Built Green

Developers can work with these systems in coordination with City of Surrey bylaws to develop storm designs that better suit community goals and sustainable living.

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TRADITIONAL is defined as:		INTEGRATED is defined as:
✓ Drainage Systems	⇨	✓ Ecosystems
✓ Reactive (Solve Problems)	⇨	✓ Proactive (Prevent Problems)
✓ Engineer-driven	⇨	✓ Interdisciplinary Team-driven
✓ Protect Property	⇨	✓ Protect Property and Resources
✓ Pipe and Convey	⇨	✓ Mimic Natural Processes
✓ Bureaucratic Decisions	⇨	✓ Consensus-based Decisions
✓ Local Government Ownership	⇨	✓ Partnerships with Others
✓ Narrow Scope of Work (drainage focus only)	⇨	✓ Holistic Scope of Work (stormwater integrated with land use)

Stormwater Planning: A Guidebook for British Columbia
Ministry of Water, Land and Air Protection, 2002

part one: understanding urban runoff

What is Surrey Doing for Stormwater?

Surrey encourages design professionals and developers to use ISMP's (Integrated Stormwater Management Plans), Best Management Practices (BMP's) and LID (Low Impact Development) practices wherever possible.

With Surrey being the fastest growing city in British Columbia, it is important that the City develops at an equal or better standard of storm water management as Canada's other largest municipalities. Much of the development occuring now will set a precedent for decades to come.

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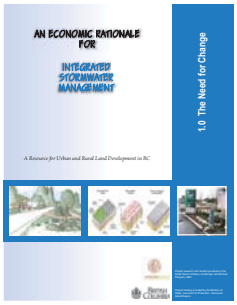
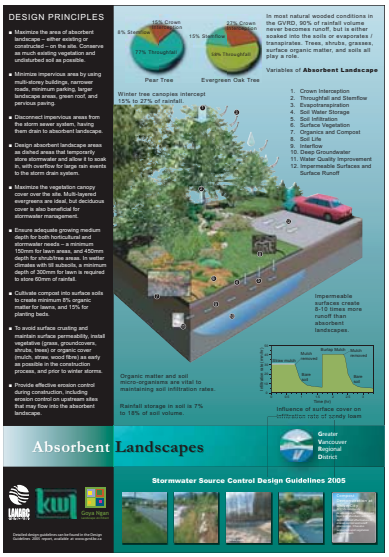
What are other big cities doing?

Vancouver is continuously amending it bylaws to incorporate increased green standards for achieving its goal of being the greenest city by 2020. For example, in July 2010 it was declared that there will be new green requirements for all rezoning applications recieved as of January 31, 2011. The requirements include that LEED Gold or Built Green Gold standards are applied to developments.



Toronto established the Green Development Standard in 2006 as a means of influencing the quality of developments for the ultimate goal of an 80% reduction in Green House Gases by 2050. Stormwater strategies play a key role in this effort, as standards are outlined for development at the low-rise non residential, low-rise residential, and mid-high rise forms of development.

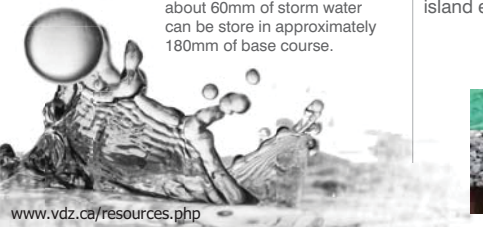


part two: storm water typologies

hardscape surfaces

Hardscape Surface Applications

- **Commercial schemes**
- **New housing developments**
- **Retail parks**
- **Car parks**
- **Government and Community Buildings and Facilities**



Tip: Permeable hardscapes contain a layer of drain rock that functions like a reservoir (approximately 33% void space). Calculations can be made to determine the amount available storage. For example, about 60mm of storm water can be store in approximately 180mm of base course.

www.vdz.ca/resources.php

permeable concrete

100-150mm thick slab

11% of finished slab mixture is open air for easy infiltration. Stone aggregates typically range from 10mm to 14mm in size.

Base material for infiltration is key and should be determined by a civil engineer for runoff and infiltration capacity (usually 150mm to 350mm)

Base material is usually a combination of a clear crush top course and road mulch lower course.

The lighter colour of the concrete can reduce impacts of the heat island effect.

permeable asphalt

60mm - 100mm thick slab

A percentage of the finished slab mixture is open air for easy infiltration. Stone aggregates typically range from 10mm to 14mm in size.

Binders and lower courses usually contain a higher stone aggregate size of 14mm to 20mm.

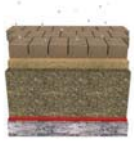
Base material for infiltration is key and should be determined by a civil engineer for runoff and infiltration capacity (usually 150mm to 350mm) depending on existing site soils i.e.) clay soils require more base material under slabs, silty gravel soils require less.
The use of asphalt increases the heat island effect.

permeable pavers

Pavers range in size - usually 80mm+ thick for surfaces that are driven on and 50mm - 60mm thick for surfaces that are only walked on.

Base material for infiltration is key and should be determined by a civil engineer for runoff and infiltration capacity (usually 150mm to 350mm) depending on existing site soils i.e.) clay soils require more base material under slabs, silty gravel soils require less.

Pavers come in a variety of colour options - some may aide in reducing the heat island effect



open pavers

Materials range from open grid hard unit pavers to plastic grass grid pavers.

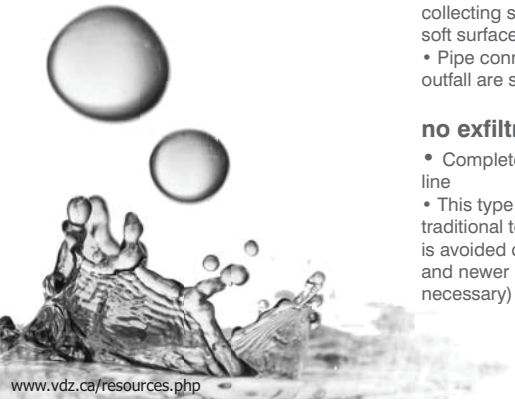
Base material for infiltration is key and should be determined by a civil engineer for runoff and infiltration capacity (usually 150mm to 350mm) depending on existing site soils i.e.) clay soils require more base material under slabs, silty gravel soils require less.

Consult with the project civil engineer and landscape architect for selection of the most appropriate type of paver application and base preparation.

part two: storm water typologies

hard surface drainage

Hardscape Surface Applications
- **Commercial schemes**
- **New housing developments**
- **Retail parks**
- **Car parks**
- **Government and Community Buildings and Facilities**



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exfiltration types

full exfiltration
• 100% on site infiltration
• Can occur with the use of softscape surface drainage systems

partial exfiltration
• Infiltration on site with overflow to storm line
• Often achieved through a “systems” approach using perforated pipes or open collecting systems embedded in soft surface drainage
• Pipe connections to storm outfall are solid

no exfiltration
• Complete discharge to storm line
• This type of exfiltration is more traditional to storm designs and is avoided on LEED projects and newer infrastructure (unless necessary)

assisting components

oil interceptors
• Used to remove hydrocarbons left by vehicles or sources of pollution
• Can help filter water before discharge
• Are often implemented as a “back-up” to soft surface storm remediation designs
• Are usually included in storage tanks and central manholes

soakaway pits
• Are composed of a buried catch basin or storage tank for deep infiltration of storm water
• Are often used as central storm infiltration focal point for areas where there is no discharge to storm
• In areas where discharge to storm is used, soakaway pits may be used as final infiltration tactic prior to water reaching an overflow within the catch basin with discharge

cisterns & storage tanks

Works with full and partial exfiltration civil designs.

Cisterns and storage tanks are used for a combination of reasons:
1) storage of storm water during intensive rainfall events where the partial or full systems may not perform at the desired rate
2) storage of storm water from hard surfaces for long-term groundwater recharge
3) storage of storm water from hard surfaces for drip or low emitter irrigation of plantings

irrigation

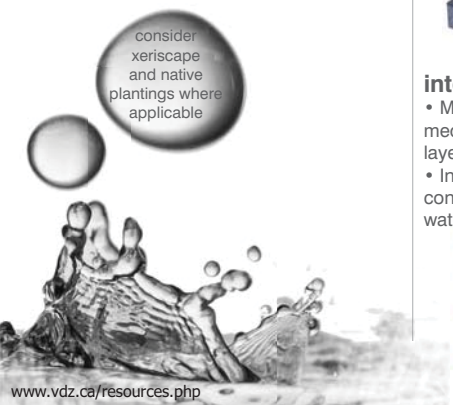
low emitter
• Includes the use of low-flow nozzles for a reduction in water consumption or the use of drip-emitters from collected storm water
• Additional supporting fabrics or bas-materials may be used in planters in coordination with a low use irrigation system to maintain water levels for plants

xeriscape
• Is an emerging trend to significantly reduce reliance on non-natural water cycles for plant consumption
• Xeriscaping planting puts focus on working with plants that are capable of handling a climates natural water cycles that can thrive without aide from irrigation
• Native plants are often used in these scenarios for their existing adaptability to a climate

part two: storm water typologies

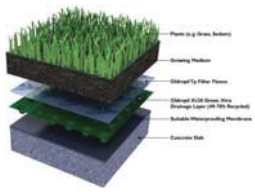
soft surface drainage

Softscape Surface Applications
- **Commercial schemes**
- **New housing developments**
- **Retail parks**
- **Car parks**
- **Government and Community Buildings and Facilities**
- **Streetscapes and promenades**

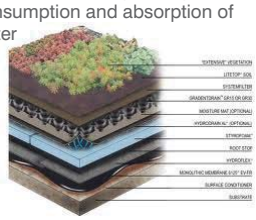


green roofs

extensive
- Usually 150mm or shallower for growing medium depth
- Roof carries lighter load
- Water is absorbed for shorter periods of time



intensive
- More than 150mm of growing medium and requires additional layers of protection
- Intended for longer range consumption and absorption of water



swaling elements

bio-swales
- Usually 2m wide and more than 6m long
- Swaled to have a minimum 12" depth (this is often the maximum allowable depth in municipalities) for infiltration of storm water
- Swales can be grassed or vegetated
- Swales can contain either partial or full exfiltration depending on their area - perforated pipes may be used
- Sand bedding layers, compacted stones, and alternative material are used to create permeability and structure

infiltration strips / trenches
- Pieces of landscape narrower than 2m that contain growing medium and prepared sub-bases for infiltration
- Their sub-structures resemble bio-swales but they can appear less obvious at the surface level

rain gardens
- Pieces of landscape wider than 2m with the capacity to infiltrate large volumes of water and support semi-wet ecosystems
- Rain gardens are intended for deeper infiltration of storm water and remediation of pollutants
- Plantings used should meet anticipated water levels for summer and winter months - great consideration of species should be considered
- Rain gardens contain a slightly elevated point of outfall; often concealed through rip-rap or boudlering used to stabilize side walls

ponds

dentention ponds
- Ponds that are created for short term storage of storm water for infiltration
- Infiltration channels are often used in the in centre of the pond for collect of sediments into dry beds for easier maintenance

retention ponds
- Ponds that a created for longer term storage of storm water for deep infiltration and remediation
- These ponds usually have alteast 1m of water depth and can support small wetland environments
- Aerators and other devices may be used to provide good circulation an prevent algae blooms

part two: storm water typologies

The most important thing a municipality or developer can do to ensure good storm management is make sure all consultants are coordinated.

To have understanding of the finer details and cross-over between respective scopes of work will play a key role in allowing consultants to select the most appropriate materials for sites and design systems to be **synchronized**.

For example, review of the images on right shows collection of roof rainwater into a splash block retainer that flows through an open system and a curb cut in the sidewalk, into a rain garden. The crossover between the building and the raingarden would have likely included **coordination** of the architect, landscape architect, mechanical engineer. Design of the rain garden would have likely included coordination between the landscape architect and civil engineer.

Remember: The ultimate goal of a storm design is performance and longevity. It's how water flows through various site elements as a system that will determine the long term benefits and success of the project.

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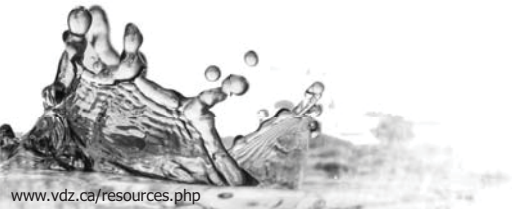
bringing it all together: integrated systems

part two: storm water typologies

bringing it all together: integrated systems

Examples of integrated systems which show cross-over between consultants. **Good storm water management can be integrated** into urban areas to add art, character, and expression to buildings and streetscapes.



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part two: storm water typologies

bringing it all together: integrated systems

Concepts for storm management can include anything from small scale details of curb cuts through large scale expansive green roofs.

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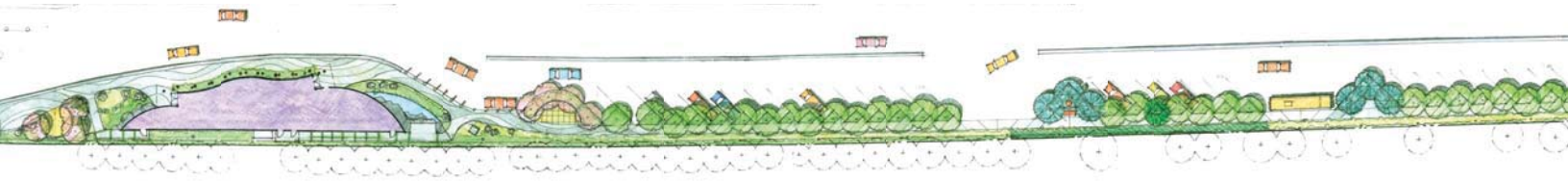
part three: precedents

LEED Gold: peace arch visitors centre



Fast Facts

- Project site was one of the first muncipal buildings required to meet LEED Gold Standards
- The tourism building visitors centre is located between Highway 99 South and an existing golf course at the border crossing
- The site stretches over 300m long with all storm water collecting into permeable concrete, open bio-basins, and a continuous bio-swale for infiltration
- The project site was the first location in Canada to test an Eco-media product - a compound created by soil scientists with the aim of providing soils with naturally occurring bacteria which break down hydrocarbons and pollutants that run off from vehicles

The revolutionary storm water system for collecting and carrying water earned the project LEED points for:

- Water efficient landscaping - the entire site has no irrigation and is thriving
- Reduction in heat island effect - the introduction of tree cover and permeable concrete met the requirements of using highly reflective materials and producing a 30% canopy cover over 5 years
- Sustainable site credits were earned for reducing the rate and quantity of runoff along with removal of phosphorus and hydrocarbons from site runoff to comply with LEED percentages
- Innovation in design credits were earned for implementing a signage program that teaches visitors about the unique design approach for managing and remediating storm water

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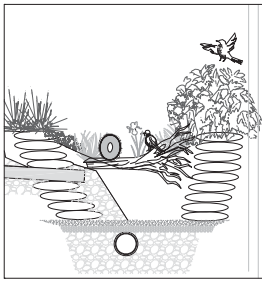
Rendering provided by
van der Zalm + associates Inc.

part three: precedents

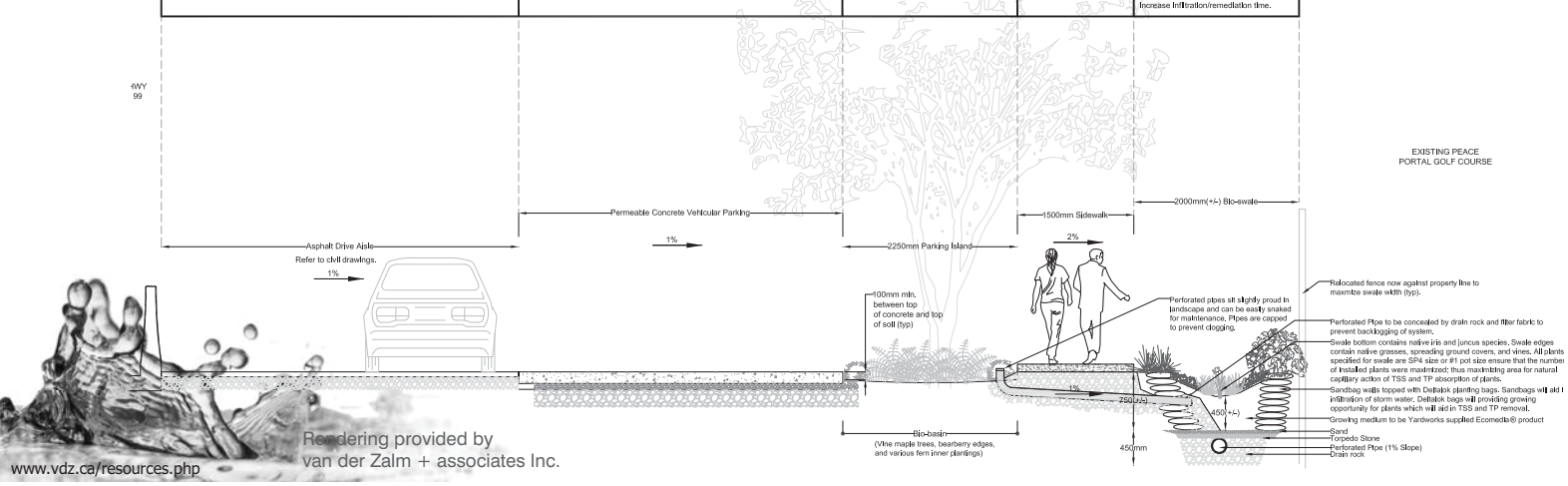
LEED Gold: peace arch visitors centre

DESIGN APPROACH / NARRATIVE

STEP ONE	STEP TWO	STEP THREE	STEP FOUR	STEP FIVE
Water hits the impervious asphalt drive aisle and runs at a 1% slope into the porous concrete slab for infiltration.	The 6" thick porous concrete slab immediately infiltrates the storm water. Water continues to permeate through the slab and 12" sub-base (composed of clear crush and ¾ minus rock). Water captured in this area during a short rain fall will evaporate or eventually drain in the adjacent bio-basins for further infiltration. Some water will permeate into the existing clay soils underneath the slab as part of the natural ground water cycle of the site. If water were to completely fill the porous concrete area during a major storm event, then excess water that collects at the surface of the porous slab traverse across a 1% slope into the adjacent bio-basin. Note: Some TSS and TP removal will also occur in this phase of the storm water management, particularly during average rainfall events where the slab is likely to hold a large quantity of storm water and release it over time via infiltration and evaporation.	The bio-basins located infront of each parking stall sit slightly low in the landscape to intentionally collect excess water that exists at the surface of the hardscape in the parking lot. Native xeriscape plants (ferns, vine maples, and bearberry) can handle wet and dry conditions and will absorb a large amount of storm water. Some TSS and TP remediation will also occur in this phase as plants will absorb these items through capillary action as part of the natural phosphate cycle.	Should an excess amount of water build up in the bio-basins then water can filter into a 4" perforated PVC pipe that flows under the sidewalk at a mild 1% slope. Water exiting the pipes will then filter through a thin cover of drain rock into a densely planted swale containing the Ecomedia® soil product. The water will be remediated via uptake by plants or processes encurred by the Ecomedia® product.	All excess storm water that cannot be infiltrated in the other phases will eventually permeate into the bio-swale for final absorption and remediation. Large amounts of TSS and TP removal will occur through reactions to both the 500mm(+/-) depth of the Ecomedia® soil and the natural absorption of densely planted vegetation. The swale is approximately 200m long and flows at 0.25% surface slope allowing for water to collect and flow slowly; promoting infiltration and absorbtion. Habitat logs are placed strategically at low points in the swale to decrease water velocity and increase infiltration/remediation time.



VIEW OF TYPICAL HABITAT LOG ENVIRONMENT
REFER TO STEP 5 DESCRIPTION



Rendering provided by
van der Zalm + associates Inc.

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part three: precedents

LEED Gold: peace arch visitors centre

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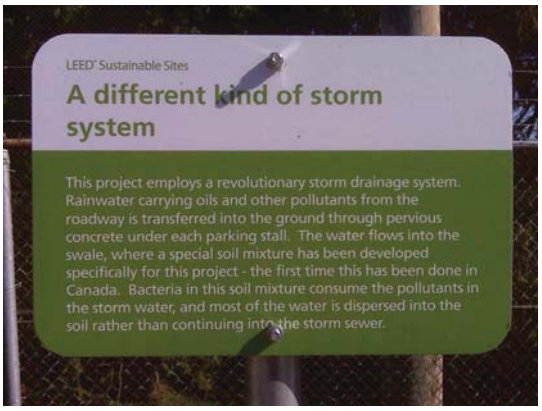

part three: precedents

LEED Platinum: vancouver convention centre

Fast Facts

• The West building features a unique marine habitat, a sophisticated drainage water and recovery system, and a seawater heating and cooling system.

• The West building's six-acre living roof – the largest in Canada and the largest non-industrial living roof in North America – features more than 400,000 indigenous plants and grasses as well as four beehives. Drainage and recovery systems are designed to collect and use rainwater for irrigation during summer months.

• The West building has received LEED (Leadership in Energy and Environmental Design) Platinum certification and is the first convention centre in the world to earn the highest LEED rating.

(facts provided by vancouverconventioncentre.com)

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part three: precedents

LEED Platinum: vancouver convention centre

Water is infiltrated through both the hard and soft surfaces of the site. The 6 acre crossing green roof is the focus of the architectural expression of the building, while surrounding hardscape pedestrian paths and plaza areas all collect storm water runoff for reuse through irrigation.

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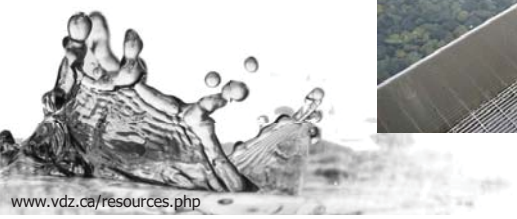
part three: precedents

LEED Gold: “Atwater Place”
Portland Oregon

Large urban rain garden and swale networks united the entire property.



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part three: precedents

LEED Gold: “Atwater Place”
Portland Oregon

This mixed use development achieved LEED Gold. Storm water integrated landscaping served as a central promenade to the entire development.

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part four: stormwater strategies

site stormwater: City of Surrey Standards

The goal for developments in Surrey is to provide:

0.5m3 of topsoil for every m2 of development
and/or
25 - 50mm of detention where landscape areas are provided

There are numerous way to achieve this goal within landscaping and civil design through the approach of creating **integrated systems**. Opportunities for creating integrated systems are numerous and vary in costs. The following slides represent some of the basic strategies for creating integrated systems, with examples seen on a variety of scales.

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Permeable walkways in Holland Park, Surrey
Design by van der Zalm + associates

part four: stormwater strategies

site stormwater: Project start-up

Stormwater Planning: A Guidebook for British Columbia
Ministry of Water, Land and Air Protection, 2002

Recommendations to Developers and Committees

There are a number of ways to address site storm water when starting a project. The ultimate goal of a good storm water design is that it functions as a natural system within the site and does not conflict or fight natural process of both design and environmental features. The requirement of 25-50mm of detention or 0.5m3 of growing medium per square meter of development means that 70 - 90% of the MAR (Mean Annual Rainfall) on a local site can be infiltrated without overflow to storm.

The challenge for consultants and developers is to provide intelligent, responsive, an effective storm water solutions on site to deal with the majority of the MAR while still having the ability to overflow during a 5 year major storm event. This can be particularly challenging when dealing with high-density developments in the City Centre where existing sites are flat and surrounding road infrastructure is in place.


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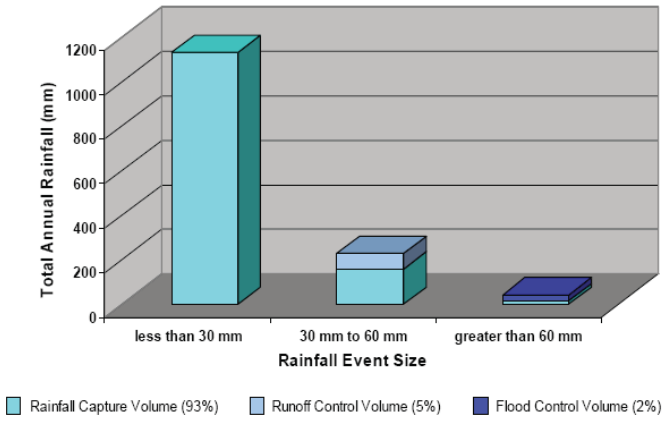
Distribution of Annual Rainfall Volume (Sardis)



Tip: The minimum soil depth for 60mm of infiltration in a soil with good hydraulic conductivity is 300mm. Soils are able to store approximately 20% of their volume as soil water. Therefore 60mm x 5 = 300mm.

Soil Type	Typical Hydraulic Conductivity Range*
• Sands and gravels	> 50 mm/h
• Sandy loams	10 – 50 mm/h
• Silty loams	5 – 40 mm/h
• Clay loams	2 – 6 mm/h
• Clays	< 2 mm/h

part four: stormwater strategies

site stormwater: Project start-up

Recommendations for addressing storm design at the start of a project include:

1

1. During the rezoning phase and site servicing phase of a development, examine the existing storm infrastructure and determine what options are available for overflow diversion of storm water. Gather the main consultants impacted by storm design (i.e. civil engineer, landscape architect, and architect) into a meeting. Ask the team questions such as:

a) What elevations are the surrounding site/street storm overflows located at?
b) Based on existing site grades; would surface level drainage (i.e. raingardens, ponds) be able to overflow to these lines in the event of a 5year storm? What would their maximum depth be before they became too deep for positive overflow drainage?
c)Would sub-surface drainage systems (i.e. storage tanks, infiltration trenches) be able to overflow to the site/street mainline during the event of a 5year storm? What would their overflow grade need to be set at?

2

2. The discussion generated by the questions in recommendation #1 should allow the consultants to determine early on what areas of a site should be considered for storm water infiltration. The is critical beacause it plays a role in what areas should be protected from the building location and gives the team a rough idea about where the majority of site storm water infiltration can occur.

3

3. In the Development Permit Process having an idea about where the majority of storm water can be infiltrated on a site can allow designers to make extended recommendations (i.e., that pervious paving be used to accomodate the majority of infiltration, or that it may be beneficial to limit underground parking to a certain area to allow room for storm storage tanks). The continued “systems” approach of enforcing all consultants coordinate with one another during this phase is a developers prime opportunity to also have an understanding of cost options prior to submitting a project for a permit.

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part four: stormwater strategies

site stormwater: townhomes

Townhomes:
Because units are smaller and already interconnected it is easy to find ways to manage site storm water on a unit to unit basis. This may be done with rain chains, bio-swales, and small amounts of permeable hardscape. Partial exfiltration systems can be used to connect overflow from each unit into a large network for managing site storm water. It is also possible to propose some off-site improvements through offering to develop rain gardens, infiltration strips, or bio-swales along streetscape boulevards for increased community benefit.

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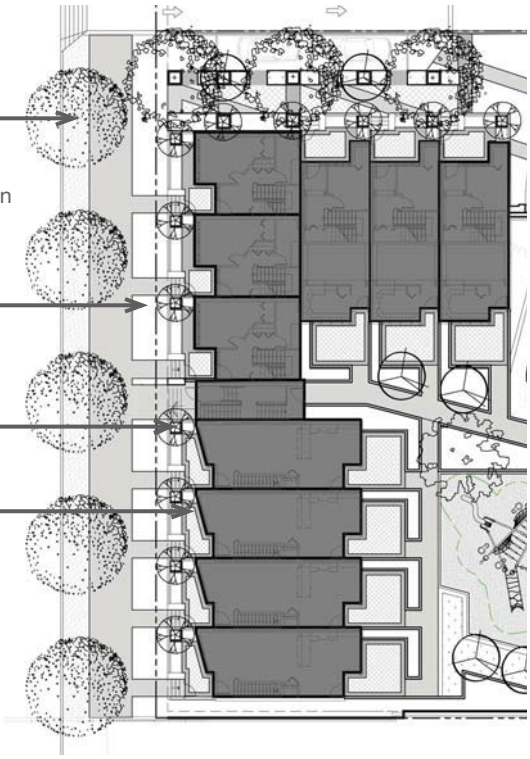
Boulevard with curb cuts for street storm water collection. Landscape to have xeriscape plantings and evergreen canopy trees for absorption. Boulevards can have bio-swales for storm infiltration prior to overflow to storm

Landscaped front yard with raingardens or bio-swales along perimeter

Raised planters with low emitter or drip irrigation for xeriscape plants. Downspouts or rain chains can direct a portion of storm water into bio-swales

Permeable paving for infiltration with piping to raingardens for short term detention and reduction in site discharge



part four: stormwater strategies

site stormwater: apartments

Apartments:
Buildings generally range from 2 to 12 floors for apartments. The aesthetic of building (i.e. whether it is tiered with planters and patios or straight vertical) depends on the site so we won't comment on verticality here. What can be said about apartments is that there is a guaranteed larger surface area of continuous hardscape needed to provide site parking. This is the key area for managing site runoff and pollutants generated on site - the use of permeable paving, bio-swales, infiltration strips or rain gardens could all be considered for creating integrated systems for collection and remediation of stormwater.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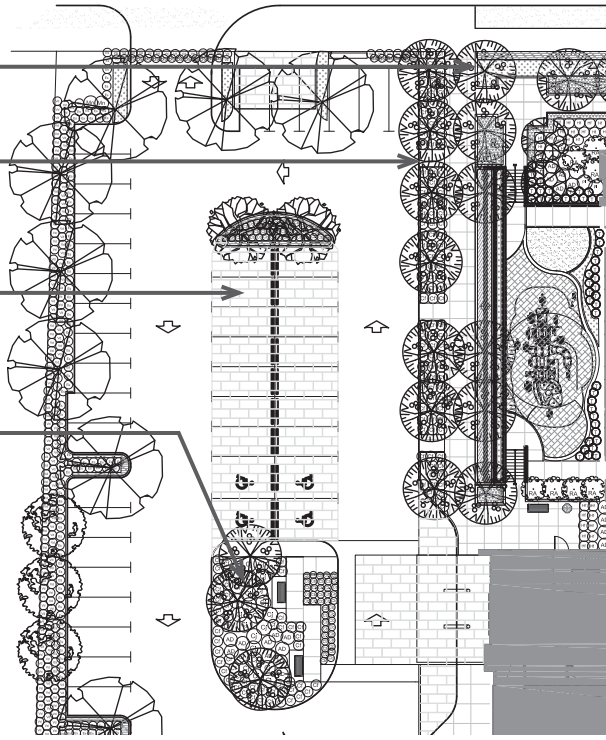
Bio-filtration through a series of planters and swales create streetscape interface and define areas of privacy

Curbless bio-swales for bio-infiltration. Evergreen shade trees for continued absorption of water.

Permeable paving in key areas of parking or mixed use designated zones to separate spaces and provide centralized infiltration

Central rain garden infiltration feature functions as site signage for apartment at drop-off. Permeable paving can drain into rain garden through partial exfiltration



part four: stormwater strategies

High rises:
This form of building often incorporates mixed-use developments as requires large amounts of community open space and semi-public open space. Parking is often offered in various forms such as off-street, temporary, private, and underground to manage volumes of residents and visitors. Larger amounts of permeable paving, stepped slabs, and green roofs are all ways of considering how to manage site storm water in highly urban environments.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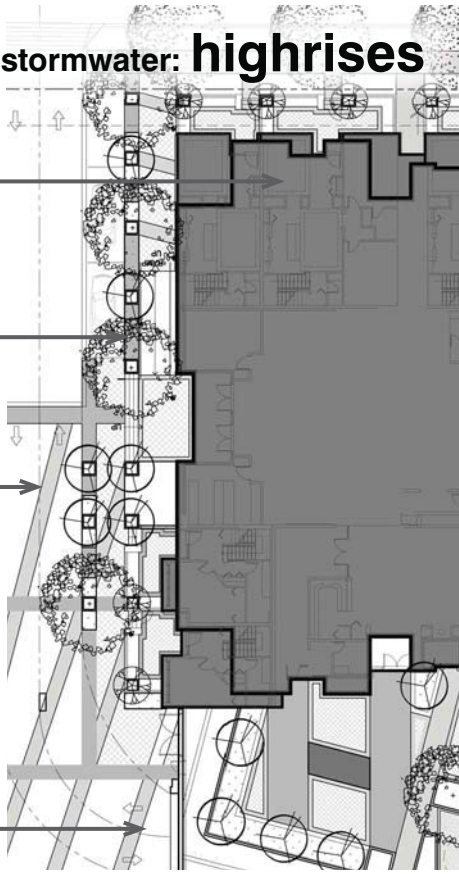
site stormwater: highrises

Green roof applications for collection of rain water can be used for grey-water recycling for site irrigation and to reduce amounts of runoff

Infiltration trenches can collect and support ground water recharge alongside areas with tree cells

Permeable paving strips can infiltrate and direct water to landscape areas for longer term infiltration and absorption

Underground parking maximizes site surface area for providing open spaces and collecting storm water



part four: stormwater strategies

site stormwater: highrises

High-rises:
Areas of high impervious coverage in high-rise or high-density developments can become challenging to design when trying to balance project affordability. However the more synchronized a storm water strategy is, the easier it is to achieve the desired outcomes.

The graphic shown right illustrates how on a typical high-density site (85% lot coverage), as little as 7.5% of the remaining lot area could reduce runoff volumes to about 10% of the totall rainfall (where soils have good hydraulic conductivity greater than 13mm/h) or about 60% of the total rainfall (where soils have poor hydraulic conductivity of about 1mm/h).

Stormwater Planning: A Guidebook for British Columbia
Ministry of Water, Land and Air Protection, 2002

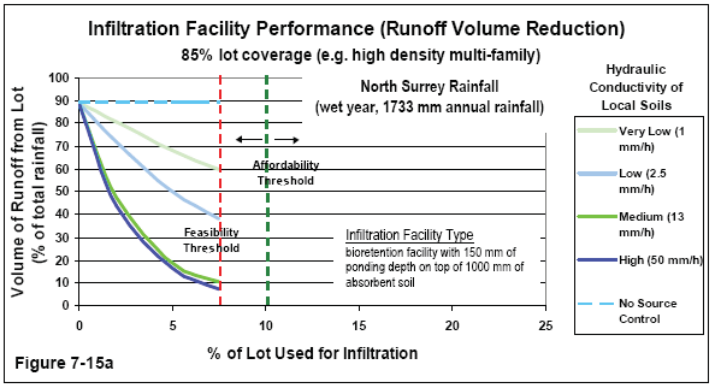


Figure 7-15a

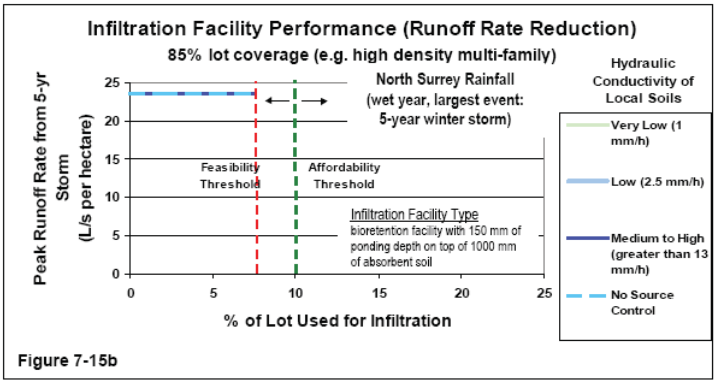


Figure 7-15b

part four: stormwater strategies

The following charts were prepared by the EPA Office of Water during a study on Low Impact Developments for large retail facilities. The recommended best management practices listed could also apply to regular buildings. These charts could be printed as a quick list for generating ideas for how to manage site storm water at the start-up of a project.

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site stormwater: quick list

Types of Best Management Practices

BMP	Circulation and Parking	Building	Loading
Cisterns		x	
Conservation (Vegetation)	x		
Downspout Disconnection		x	
Filter Strips	x		
Infiltration Beds/Trenches or Dry Wells	x		
Pocket Wetlands			
Porous Pavement	x		
Rain Gardens	x		x
Reforestation (Vegetation)	x		
Sand Filters	x		x
Soil Amendments	x		
Vegetated Roof		x	
Water Conservation		x	
Pollution Prevention			x
Tree Box Filters	x		x
Bioretention Slopes	x		x

New Developments vs. Retrofits

BMP	New Development	Retrofit
Cisterns	●	●
Conservation (Vegetation)	●	○
Downspout Disconnection	○	●
Filter Strips	●	●
Infiltration Beds/Trenches or Dry Wells	●	◉
Pocket Wetlands	●	●
Porous Pavement	●	◉
Rain Gardens	●	●
Reforestation (Vegetation)	●	●
Sand Filters	●	●
Soil Amendments	●	●
Tree Box Filters	●	●
Vegetated Roofs	●	●
Vegetated Swales	●	●

Key: ● Highly Suitable ◉ Moderately Suitable ○ Not Suitable

part four: stormwater strategies

site stormwater: costs and maintenance

Surface and Sub-surface Drainage

The term surface facility refers to features that infiltrate storm water at the surface level (i.e. rain gardens, bio-swales, and storm water ponds). The term sub-surface facility refers to features that infiltrate storm water below the surface level (i.e. trench drains and soakaway pits). Site specific elements such as topogrpahy, scale and soil type affect the scale and design of an infiltration facility. Facilities can range from $30 - $170 per m2. The operation and maintenance of surface level facilities are more frequent but less expensive than sub-surface facilities. The operation and maintenance of surface facilites are unique in that they also serve an aesthetic fucntion (i.e. maintenance of landscape plantings). Annual costs for surface facilities usually cost between 5-10% of capital costs. Cost for sub-surface facilities are less frequent but cost more money (i.e. cleaning of soakaway trenches), resulting between 5-20% of the total annual capital costs.

Absorbant Landscaping

Depending on soils depths and plant type, absorbant landscaping can range from $25 to $70 per m2. The lower range of $25 is inclusive of a typical grass setting with approximately 150mm of soil for the grass and tree canopy. The higher end of the range is more typical of shrub bed plantings which include a minimum soil depth of 450mm.

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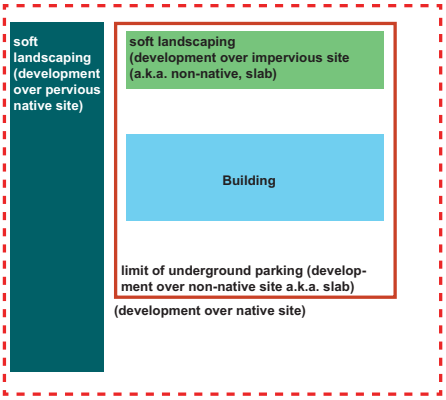
Cost statistics from
Stormwater Planning: A Guidebook
for British Columbia
Ministry of Water, Land and Air
Protection, 2002

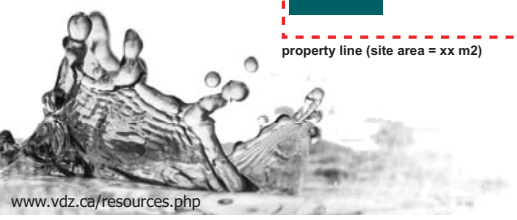
Pervious Paving

The cost of pervious paving ranges from $200-300 per m2 depending on the design and required amount of base material. This can be 2 to 3 times the cost of regular paving which is $50 - $100m2. There are also unique maintenance requirements for this form of paving such as vaccuum sweeping. It is highly recommended that developers are encouraged to locate sources of maintenance equipment and have an understanding of their material costs when determining storm water approaches in the design phase of a project.

part five: Complying with Surrey standards

Working with the Storm Water Mitigation Calculator





site stormwater: real world examples

Step One: Once a concept plan for a site is developed, complete cells in green on the excel chart to see how initial landscaping (on slab and over the native site) manages site storm water.

In these following scenarios, the total site area is defined by the property line and is graphically shown with the red dashed line (- - - - - - - - - -). The total disturbed area of the site requiring storm water mitigation remains the same as shown in yellow.

Calculate the areas of soft-landscape according to slab vs. non-slab conditions. On the excel chart this is defined as non-native vs native. Once totals have been entered, place in total areas of native vs. non-native landscaping in the excel chart to calculate what percentage of the site's area is being infiltrated and what percentage remains impervious.

Note: This initial step is intended to give developers a quick "snap shot" of how much area is left that needs to be diverted into pervious surfaces (either additional soft landscapes, storage units, or pervious hardsurfaces).

Definition of mitigation for Surrey:
The requirement of 25-50mm of detention or 0.5m3 of growing medium per square meter of development means that 70 - 90% of the MAR (Mean Annual Rainfall) on a local site can be infiltrated without overflow to storm.

Step Two: In step two areas identified in green may be altered with to understand what percentage's of soft landscaping or pervious hardsurfaces are needed to achieve the "detention deficit" of "0".

Step two functions as the developer's cost-benefit analysis - it allows developers to weigh the costs of soft landscape areas against the costs of hard surfaces areas needed for storm water mitigation. Growing medium depths, aesthetics, and material type are all impacted during the design development of a site. Using this tool as a cost-benefit analysis will enable developers and consultants to make conscientious decisions about the site design that respects the requirements of storm water mitigation and economics of the development.

Areas shown in yellow will auto-update in step two everytime areas in green are changed. Consult with the project Landscape Architect and Civil Engineer to understand more about pervious hardsurface options and soil requirements of plants to ensure that green entries are realistic.

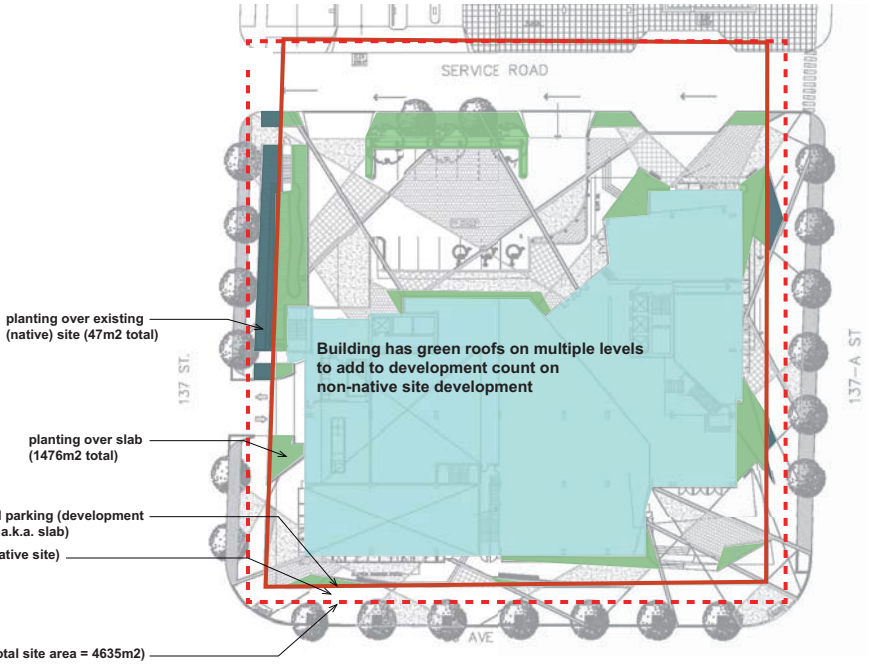
Note: Step two functions as a way to work with soil depths, pervious hardscape storage, and other means to determine how much of the remaining impervious area needs to become pervious to completely mitigate storm water. The "detention deficit" must reach "0" in step two in order to prove site mitigation meets Surrey's requirement or the site must recieve storage tanks, etc to comply.

part five: Complying with Surrey standards

site stormwater: real world examples

Surrey City Centre Development Mitigation:
Highrise Mixed-Use Development

		Input		
A	Total Site Area	4635	m^2	
U	Protected Undisturbed Area	0	m^2	0%
D	Total Disturbed Area Calculated	4635	m^2	100%
P_I	Pervious Landscaping (over native soil)	47	m^2	1%
S_d	*Topsoil Depth In Pervious Landscaping (over native soil)*	450	mm	
P_P	Pervious Surfaces (over native soil)	0	m^2	0%
I_I	Landscaping (min 75 mm growing media over impervious)	1476	m^2	32%
I_c	Impervious (no landscaping)	3112	m^2	67%



part five: Complying with Surrey standards

site stormwater: real world examples

Surrey City Centre Development Mitigation:
Highrise Mixed-Use Development

Step One

		Input		
				Instructions: Provide the values for the cells highlighted in Green
A	Total Site Area	4635	m^2	
U	Protected Undisturbed Area	0	m^2	0%
D	Total Disturbed Area Calculated	4635	m^2	100%
P_i	Pervious Landscaping (over native soil)	47	m^2	1%
S_d	*Topsoil Depth In Pervious Landscaping (over native soil)*	450	mm	Max 450mm unless designed.
P_p	Pervious Surfaces (over native soil)	0	m^2	0%
I_l	Landscaping (min 75 mm growing media over impervious)	1476	m^2	32%
I_i	Impervious (no landscaping)	3112	m^2	67%

Step Two

Summary of Topsoil and Detention Requirements

Stage 1 Infiltration Provided

T_p	Topsoil Provided (S_d x P_i)	21.15	m^3
I_t	Area of impervious surface treated with topsoil (T_p/0.5)	42.3	m^2
I_r	Area of impervious surface not mitigated with topsoil (I_i-I_t)	3070	m^2

Stage 2 Detention Required

D_l	Detention for Landscape over Impervious (0.05 x I_l)	74	m^3
D_i	Detention for Untreated Impervious areas (0.02 x I_i)	61	m^3
Dt	Total Detention required (D_l + D_i)	135	m^3
	Allowable Discharge rate is 3 l/s/ha	1.4	l/s

Stage 3 Detention Accomplished

Dt	Total Detention required (D_l + D_i)	135	m^3
Sde	Average soil depth in landscape over impervious*	0.3	m
Sd	Soil detention over impervious (avg. depth * 0.1 * area)**	**74**	**m^3**
D%	Percentage of Impervious (non landscape) availible for mitigation measures***	37.2	%
Di	Area of opportunuties for detention over impervious***	1229	m2
Md	Average depth of materials ****	0.05	m
Dit	Engineered detention over impervious	**61**	**m^3**

Stage 4 Deficit Calculations

Dtot	Total Detention provided over impervious	135	m^3
Ddef	**Detention deficit*****	**0**	**m^3**

* while 75mm is minimum, average depth by BCLNA standards will be greater, and can likely average 300mm
** assumes 1mm detention per 10mm of soil.
*** areas where slab drains could be held high (ie/ 25mm or 50mm), use of drainage mat, additional crushed gravels for detention.
Number does not necessarily equal total non-landscaped impervious, due to potential strucutural cost implications, but could, in theory
**** depth of detention over impervious
***** goal is that this number reaches ZERO, otherwise alternatives to be undertaken, including on site tanking

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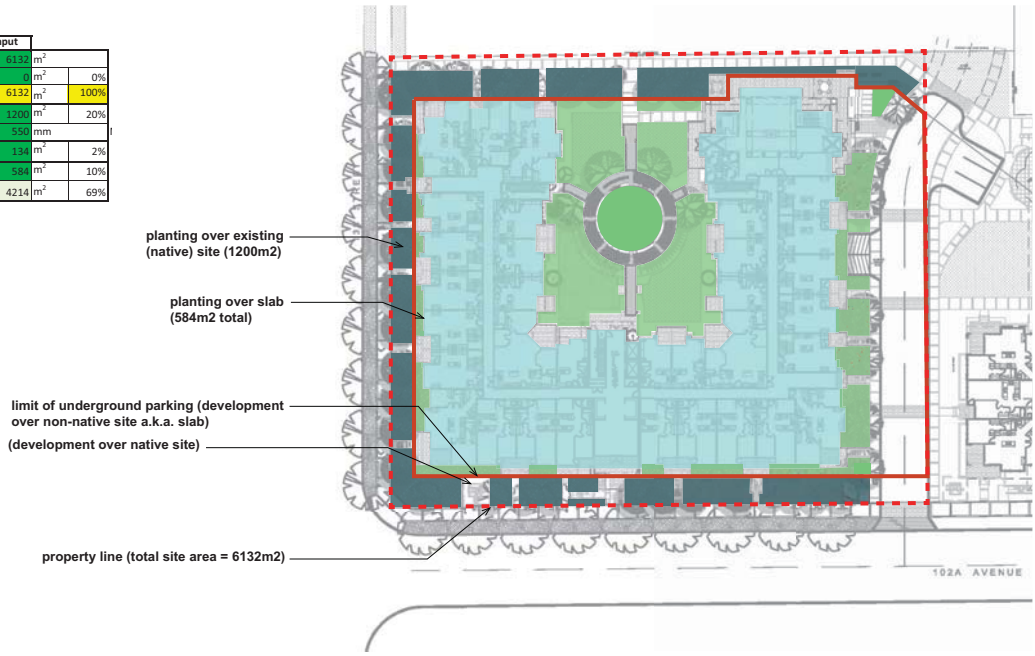
part five: Complying with Surrey standards

site stormwater: real world examples

Surrey City Centre Development Mitigation:
Low-rise Multi-family Development

		Input		
A	Total Site Area	6132	m^2	
U	Protected Undisturbed Area	0	m^2	0%
D	Total Disturbed Area Calculated	6132	m^2	100%
P_I	Pervious Landscaping (over native soil)	1200	m^2	20%
S_d	*Topsoil Depth In Pervious Landscaping (over native soil)*	550	mm	
P_p	Pervious Surfaces (over native soil)	134	m^2	2%
I_l	Landscaping (min 75 mm growing media over impervious)	584	m^2	10%
I_c	Impervious (no landscaping)	4214	m^2	69%



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part five: Complying with Surrey standards

site stormwater: real world examples

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Surrey City Centre Development Mitigation:
Low-rise Multi-family Development

Step One

		Input		
A	Total Site Area	6132	m^2	
U	Protected Undisturbed Area	0	m^2	0%
D	Total Disturbed Area Calculated	6132	m^2	100%
P_l	Pervious Landscaping (over native soil)	1200	m^2	20%
S_d	*Topsoil Depth In Pervious Landscaping (over native soil)*	550	mm	Max 450mm unless designed.
P_s	Pervious Surfaces (over native soil)	134	m^2	2%
I_l	Landscaping (min 75 mm growing media over impervious)	584	m^2	10%
I_s	Impervious (no landscaping)	4214	m^2	69%

Instructions: Provide the values for the cells highlighted in Green

Step Two

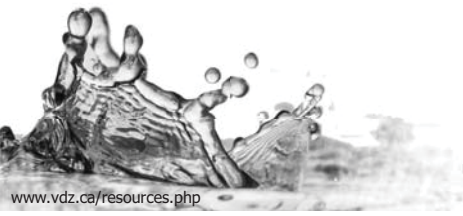
Summary of Topsoil and Detention Requirements			
Stage 1	**Infiltration Provided**		
T_p	Topsoil Provided ($S_d \times P_l$)	660	m^3
I_t	Area of impervious surface treated with topsoil ($T_p/0.5$)	1320	m^2
I_r	Area of impervious surface not mitigated with topsoil ($I_t - I_s$)	2894	m^2
Stage 2	**Detention Required**		
D_l	Detention for Landscape over Impervious (0.02 x I_l)	12	m^3
D_s	Detention for Untreated Impervious areas (0.05 x I_r)	145	m^3
Dt	Total Detention required ($D_l + D_s$)	156	m^3
	Allowable Discharge rate is 3 l/s/ha	1.8	l/s
Stage 3	**Detention Accomplished**		
Dt	Total Detention required ($D_l + D_s$)	156	m^3
Sde	Average soil depth in landscape over impervious*	0.3	m
Sd	Soil detention over impervious (avg. depth * 0.1 * area)**	**18**	**m^3**
D%	Percentage of Impervious (non landscape) availible for mitigation measures***	66	%
Di	Area of opportunuties for detention over impervious***	2781	m2
Md	Average depth of materials ****	0.05	m
Dit	Engineered detention over impervious	**139**	**m^3**
Stage 4	**Deficit Calculations**		
Dtot	Total Detention provided over impervious	157	m^3
Ddef	**Detention deficit*****	**0**	**m^3**

* while 75mm is minimum, average depth by BCLNA standards will be greater, and can likely average 300mm.
** assumes 1mm detention per 10mm of soil.
*** areas where slab drains could be held high (ie/ 25mm or 50mm), use of drainage mat, additional crushed gravels for detention.
Number does not necessarily equal total non-landscaped impervious, due to potential strucutural cost implications, but could, in theory.
**** depth of detention over impervious
***** goal is that this number reaches ZERO, otherwise alternatives to be undertaken, including on site tanking.

part five: Complying with Surrey standards

Surrey City Centre Development Mitigation:
High-rise Multi-family Development

		Input		
A	Total Site Area	10385	m^2	
U	Protected Undisturbed Area	0	m^2	0%
D	Total Disturbed Area Calculated	10385	m^2	100%
P_i	Pervious Landscaping (over native soil)	4516	m^2	43%
S_d	*Topsoil Depth In Pervious Landscaping (over native soil)*	450	mm	
P_p	Pervious Surfaces (over native soil)	538	m^2	5%
I_s	Landscaping (min 75 mm growing media over impervious)	984	m^2	9%
I_c	Impervious (no landscaping)	4347	m^2	42%



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part five: Complying with Surrey standards

site stormwater: real world examples

Surrey City Centre Development Mitigation:
High-rise Multi-family Development

Step One

		Input		
A	Total Site Area	10385	m^2	
U	Protected Undisturbed Area	0	m^2	0%
D	Total Disturbed Area Calculated	10385	m^2	100%
P_i	Pervious Landscaping (over native soil)	4514	m^2	43%
S_d	*Topsoil Depth In Pervious Landscaping (over native soil)*	450	mm	Max 450mm unless designed.
P_p	Pervious Surfaces (over native soil)	539	m^2	5%
I_L	Landscaping (min 75 mm growing media over impervious)	984	m^2	9%
I_i	Impervious (no landscaping)	4347	m^2	42%

Instructions: Provide the values for the cells highlighted in Green

Step Two

Summary of Topsoil and Detention Requirements			
Stage 1	**Infiltration Provided**		
T_p	Topsoil Provided (S_d x P_i)	2032.2	m^3
I_s	Area of impervious surface treated with topsoil (T_d/0.5)	4064.4	m^2
I_c	Area of impervious surface not mitigated with topsoil (I_i-I_s)	283	m^2
Stage 2	**Detention Required**		
D_i	Detention for Landscape over Impervious (0.02 x I_s)	20	m^3
D_c	Detention for Untreated Impervious areas (0.05 x I_c)	**14**	m^3
Dt	Total Detention required (D_i + D_c)	34	m^3
	Allowable Discharge rate is 3 l/s/ha	3.1	l/s

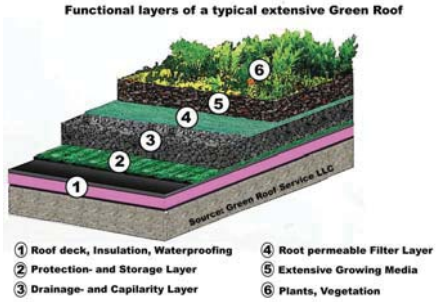
Stage 3	**Detention Accomplished**		
Dt	Total Detention required (D_i + D_c)	34	m^3
Sde	Average soil depth in landscape over impervious*	0.3	m
Sd	Soil detention over impervious (avg. depth * 0.1 * area)**	**30**	m^3
D%	Percentage of Impervious (non landscape) availible for mitigation measures***	2	%
Di	Area of opportunuties for detention over impervious***	87	m2
Md	Average depth of materials ****	0.05	m
Dit	Engineered detention over impervious	**4**	m^3
Stage 4	**Deficit Calculations**		
Dtot	Total Detention provided over impervious	34	m^3
Ddef	**Detention deficit*****	**0**	m^3

* while 75mm is minimum, average depth by BCLNA standards will be greater, and can likely average 300mm.
** assumes 1mm detention per 10mm of soil.
*** areas where slab drains could be held high (ie/ 25mm or 50mm), use of drainage mat, additional crushed gravels for detention.
Number does not necessarily equal total non-landscaped impervious, due to potential strucutural cost implications, but could, in theory.
**** depth of detention over impervious
***** goal is that this number reaches ZERO, otherwise alternatives to be undertaken, including on site tanking.

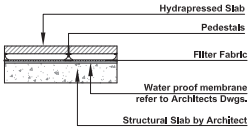
part five: Complying with Surrey standards

site stormwater: real world examples

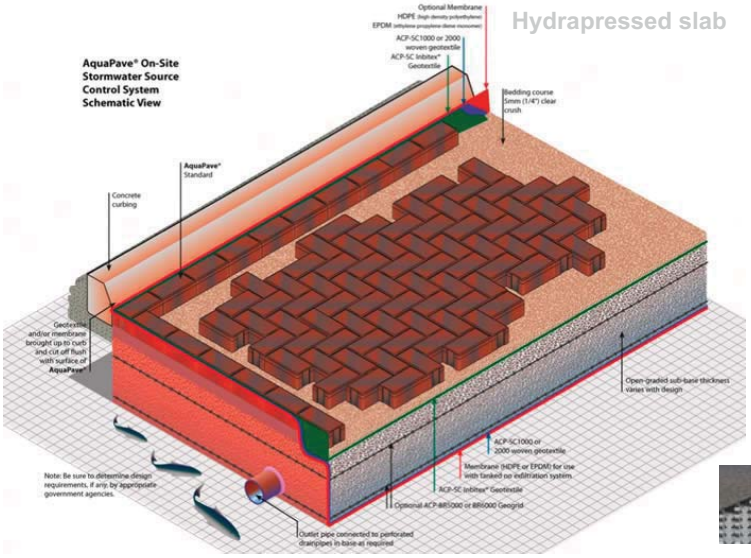
Examples of materials used to create detention on slab



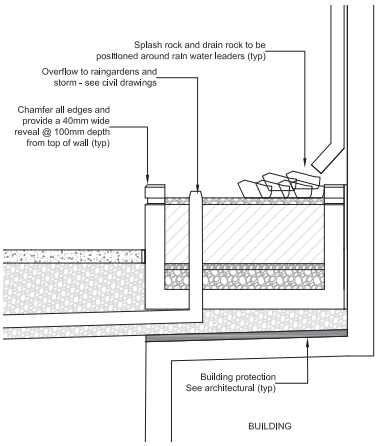
Green roof application



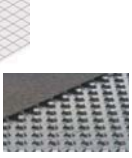
Hydrapressed slab

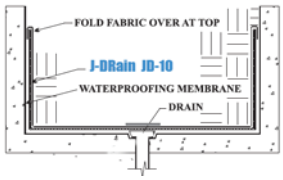


Permable pavers



Planter with Raised Drain





Drainage dentention fabric for planters

part six: appendices

resources & links

National Agencies and Non-profit Links

The Canadian Green Building Council
www.cagbc.ca

The US Environmental Protection Agency
http://www.epa.gov/owow_keep/NPS/index.html

The Green Roofs for Healthy Cities Coalition
www.greenroofs.ca

Provincial and Municipal Links

Stormwater Planning: A guidebook for British Columbia
http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html

Rain and Drain Simulator
http://www.sustainabilityinmybackyard.ca/home

Water Bucket
http://www.waterbucket.ca

The Water Balance Model
http://bc.waterbalance.ca

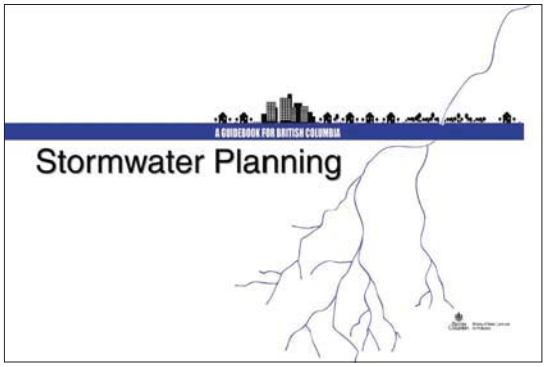
Surrey Storm Water
http://www.surrey.ca/city-government/4706.aspx

Research and Learning

http://www.perviouspavement.org/

http://www.cement.ca/en/Parking-Lots/Pervious-Concrete.html

http://www.concretenetwork.com/pervious/

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part six: appendices

general suppliers

Permeable Concrete

LaFarge Canada
http://www.lafarge-na.com

Sustainable Concrete Canada
http://www.sccanada.net/

Permeable Pavers

Aquapavers
http://www.aquapave.com/

Unilock Pavers
http://www.unilock.com/Products/Pavers/Permeable

Grass Grid
http://www.landscapesupply.com/products/main.php?cat_id=610

Eco-grid
http://www.terrafirmenterprises.com/

Storm Infrastructure Supplies

Nilex
http://www.nilex.com/

Corix
http://www.corix.com/

Green Roofs & Living Walls

G-Sky Green Walls and Roofs
www.gsky.com

Mubi Green Walls
www.mubi.ca

Roofscapes Inc
www.roofmeadows.com

Tecta America
www.tectaamerica.com

Soils & Plants

Eco-media Soils
www.yardworkssupply.ca

BCLNA
www.bclna.com

www.vdz.ca/resources.php

A-2.2

Consultant Report

SANITY SEWER INFRASTRUCTURE

6 Sanitary Infrastructure

The Surrey City Centre area includes approximately 550 ha of land and is generally bound by 132 Street to the west, 140 Street to the east, 112 Avenue to the north and 96 Avenue to the south. The City of Surrey has updated their City Centre Plan, which predicts a dramatic increase in population that will place additional demands on the existing sanitary sewer infrastructure, and will ultimately exceed the capacity of many existing pipelines and the existing capacity at the Quibble Creek pump station.

The purpose of this study is to assess the impacts of the anticipated growth within City Centre and the associated increase in sanitary demands on the existing network and provide recommendations for network improvements taking into account network hydraulics and anticipated costs.

The City provided the City Centre Land Use Plan as the basis for the analysis, as shown in ***Figure 6.1***. The study area is divided into two basic sanitary catchment areas by the local topography, as shown in ***Figure 6.2***. The northern City Centre catchment is collected by gravity and flows into the Greater Vancouver Sewerage and Drainage District (GVS&DD) North Surrey Interceptor. The southern City Centre catchment is collected by gravity at the Quibble Creek Pump Station and pumped to a trunk main in the northern catchment, which in turn flows into the GVS&DD North Surrey Interceptor. Both catchments discharge to the regional system at 132 Street and 114 Avenue.

This study estimates sanitary flows for development conditions under five scenarios and identifies what sanitary infrastructure upgrades will be necessary to support development in this area. These scenario horizons are:

- Existing (2013);
- Year 2023;
- Year 2033;
- Year 2043; and,
- Build Out Year 2083 (Sewer Equivalent Build Out).

The Surrey Planning and Development Department split City Centre into four projected growth areas (see Appendix A), and predicted what percentage of each area would develop under each of the five scenarios. The corresponding number of units and jobs was then used to develop the sewer model.

The Sewer Equivalent Build Out, represents the full development saturation scenario for City Centre sewer demands and is recommended for sanitary sewer sizing due to the long service life, and high installation costs of installing sewer infrastructure.

Existing studies and information utilized in the development of this report included:

- City Centre Land Use Plan;
- City of Surrey geodatabase;
- GIS shape files of City sanitary sewer network and pump stations;
- GIS shape files of the City's legal parcels;
- City of Surrey Design Criteria Manual 2004;
- City of Surrey November 28, 2012 Engineering Bulletin: Design of Sanitary Sewer System Components;
- City of Surrey Topographic information; and
- ASCE Manual and Report on Engineering Practice No.60.

Terms and Definitions

Table 6.1 provides a summary of key terms (with abbreviations) and definitions used throughout this report.

Table 6.1 Key Terms and Definitions

Key Term (and Abbreviation)	Definition
Average Dry Weather Flow (ADWF)	The lowest 24-hour average sanitary flow value during a 7-day period of dry weather. The sanitary flow is comprised of base sanitary flow plus groundwater infiltration (ADWF = BSF + GWI).
ASCE Manuals and Reports on Engineering Practice 60	American Society of Civil Engineers Manual of Practice No. 60 for Gravity Sanitary Sewer Design and Construction.
Base Sanitary Flow (BSF)	All wastewater flow from residential, commercial, industrial and institutional sources that the sanitary sewer system is intended to carry. (BSF = ADWF – GWI).
Diurnal Pattern	Pattern describing the variance in sewage flows over a day,
Groundwater Infiltration (GWI)	Groundwater infiltration that enters the sanitary sewer system during dry weather periods; through breaks, cracks, misaligned joints, tree root punctures and manhole joints and covers. In general, GWI = 70% - 85% of minimum night-time flow.
Metro Vancouver(MV)/ GVS&DD	Regional District whose trunk system collects all sewage from the City, and neighbouring municipalities, and conveys it to a treatment facility.
Hydraulic Grade Line (HGL)	The maximum level of water in the pipe system, calculated as the height that liquid will rise in a piezometer using the Bernoulli's Equation.
Inflow	Stormwater that enters the sewer through direct connections (i.e. CB leads or roof drains connected to the sanitary sewer).
Inflow and Infiltration (I&I)	The total inflow and infiltration that enters the sanitary sewer system from all sources, equal to GWI + RDII.
Peak Dry Weather Flow (PDWF)	Peak instantaneous sanitary flow value during dry weather conditions (peak of the diurnally varying BSF plus GWI).
Peak Wet Weather Flow (PWWF)	Maximum instantaneous sanitary flow value. It represents all flow contributions carried by the sanitary sewer system (equals PDWF + RDII).

Rain Dependent Inflow and Infiltration (RDII)	All stormwater inflow (see above) into the sanitary sewer system plus increase in GWI that occurs directly due to the influence of rainfall.

Unit Conversions

Volume	Litres to gallons	3.79 Litres = 1.0 US gallon and 4.54 Litres = 1.0 Imp. gallon
HGL	Geodetic to MV Datum	0.0m Geodetic = MV Datum of 91.37 ft
Flow Rate	L/s to gpm	1.0 L/s = 15.9 USgpm = 13.2 Imp. gpm

6.0 Existing & Future - Servicing Catchments & Details

6.0.1 Sanitary Population Summary

City Centre is expected to grow dramatically in residential, institutional, and commercial populations. This section identifies future populations as well as equivalent populations generated to determine sewage loadings. The origins of this information are provided in ***Appendix A***. These populations were developed specifically for predicting future sewage loadings in City Centre and are not intended for other uses.

The study area is divided into two basic sanitary catchment areas by the local topography, as shown in ***Figure 6.2***. The northern City Centre catchment is collected by gravity and flows into the Greater Vancouver Sewerage and Drainage District (GVS&DD) North Surrey Interceptor. The southern City Centre catchment is collected by gravity at the Quibble Creek Pump Station and pumped to a trunk main in the northern catchment, which in turn flows into the GVS&DD North Surrey Interceptor. Both catchments discharge to the regional system at 132 Street and 114 Avenue.

It is important to recognize that sewer catchments contributing to the sanitary network within the study area extend beyond the City Centre boundaries and are incorporated as part of this analysis. For the purposes of this report, populations within City Centre are identified as “Internal”, and contributing catchments with residential and institutional land uses located adjacent to the City Centre boundary are identified as “External”.

Some residential areas within the south west region of City Centre drain to sanitary sewers that are located outside of the City Centre boundary. To analyze these sewers it was necessary to consider additional catchments contributing flow to these pipes that are outside of City Centre. These catchments have been labelled as “External 2”. External 2 existing and future populations were estimated with the same unit population densities as External 1. ***Figure 6.2*** graphically identifies the external and internal catchment areas.

The City provided internal residential population, residential units, and employment populations for each scenario horizon. Currently, there is no existing or foreseen future industrial land uses to occur within the study area and as such the population counts have been generated for residential, institutional and commercial (IC) land uses. Therefore, the following internal and external populations have been generated as follows:

Internal Populations:

- Residential populations were provided by the City based on staged growth predictions of development of the Land Use Plan **(Appendix A**). A population density of 3.75 people per single-family unit with a secondary suite at 1.93 additional people per single family residence was added to 38% of all single family homes in 2013, and 100% of all single family homes by 2023 and beyond.

- Commercial equivalent populations were generated using the City’s unit rate of 18.6 m^2/employee (200ft^2/employee) applied to commercial floor space to determine the number of employees. Employees were converted to equivalent population by a factor of 0.27 as per the ASCE Manual and Report on Engineering Practice No.60. This factor is more refined than what is prescribed in the City’s Design Criteria by including equivalent populations for offices.

- Institutional equivalent populations were generated based on the type of facility and projected occupancy. The rates for sanitary flows per unit type were extracted from the 2010 Sewer Model. Details for these facilities are provided in ***Appendix A***. Institutional bed and student estimates were provided by the Fraser Health Authority and Surrey School District respectively. As per the City’s 2004 Design Criteria Manual, an average dry weather flow (ADWF) of 350 l/c/d was used.

External Populations:

- The population external to the City Centre Plan area that contributes to flows into the sanitary pipe network is identified as External 1. As noted earlier, this area drains to sanitary sewers that are located outside of the City Centre boundary. Information for External 1 was provided by the City in the form of a total population evenly distributed over an identified service area (***Appendix A***). Population was then allocated to each lot by applying the unit population density to the area of contributing lots.

- An average population density determined from the external catchment information provided by the City, was applied to the lots in External 2 to estimate the residential population.

- External 1 was reported as having only institutional and residential land uses, and External 2 is exclusively residential.

Table 6.2 summarizes the total equivalent populations used in the sanitary sewer network analysis. Further details as to how equivalent populations for institutional have been generated are provided in **Appendix A** for each horizon year.

Table 6.2 Summary of Sanitary Populations by Horizon Year

Horizon	Catchment	Equivalent Population			Total Equivalent Population	Total Equivalent Population
		Residential*	Commercial**	Institutional***		
Existing (2013)	Internal	33,812	6,368	2,239	42,419	50,951
	External 1	5,645	0	1,907	7,553	
	External 2	980	0	0	980	
2023	Internal	52,442	7,471	2,758	62,671	75,561
	External 1	9,203	0	2,159	11,362	
	External 2	1,528	0	0	1,528	
2033	Internal	71,858	8,730	3,290	83,878	99,393
	External 1	11,217	0	2,436	13,653	
	External 2	1,862	0	0	1,862	
2043	Internal	92,106	10,190	3,376	105,672	121,371
	External 1	11,217	0	2,620	13,837	
	External 2	1,862	0	0	1,862	
Build Out	Internal	160,599	15,274	3,927	179,800	196,466
	External 1	11,217	0	3,587	14,804	
	External 2	1,862	0	0	1,862	

** Residential equivalent populations based on residential populations provided by the City.*
*** Commercial equivalent populations based on employment populations provided by the City and applying a factor of 0.27 as per the ASCE Manual and Report on Engineering Practice No.60.*
**** Institutional equivalent populations based on populations provided by the City, Surrey School District, and Fraser Health Authority.*

6.0.2 Sanitary Flow

Sanitary flows for City Centre were determined as follows:

ADWF

Average dry weather flow (ADWF) was calculated as per the City of Surrey Engineering Department Design Criteria Manual (May 2004) based on a per capita sewage flow rate of 350 L/c/d and the populations determined in **Section 6.0.1**.

PDWF

A Harmon Peaking factor, calculated as per section 4.0 of the City of Surrey Engineering Department Design Criteria Manual (May 2004), was applied to the ADWF on a catchment by catchment basis to calculate peak dry weather flow (PDWF).

Inflow and Infiltration

Inflow and infiltration (I&I) rates for City Centre were provided by the City in the form of shape file titled City_Centre_Lots.shp that identifies I&I unit rates at the lot level. The shape file is based on monitoring results observed by the GVS&DD and the City. A map of I&I levels and their distribution is included as ***Figure 6.3***.

I&I unit rates were applied to lot area to calculate I&I for individual lots. An additional 20% surcharge was added to the calculated I&I to account for road ways.

PWWF

Peak dry weather flow (PDWF) was combined with I&I on a catchment by catchment basis to calculate peak wet weather flow (PWWF).

6.1 Hydraulic Model Development

The City Centre sanitary hydraulic model was developed in Microsoft Excel utilizing attribute tables from the City's GIS database, performance criteria from the City of Surrey Engineering Department Design Criteria Manual (May 2004), and the flow rates identified in ***Section 6.0.2***.

Sanitary Pipe Network

The sanitary pipe network attributes for City Centre were imported from the City's GIS database. Attributes imported included:

- Upstream invert;
- Downstream invert;
- Length; and
- Diameter.

As per the City of Surrey Engineering Department Design Criteria Manual (May 2004) the full pipe capacity for each pipe was calculated using the Manning equation. A Manning's coefficient of roughness n= 0.013 was applied to all pipes.

Sanitary Catchments

Sanitary sub-catchments were developed around block length manhole to manhole pipe segments. Lots connected to each pipe segment were identified as a sub-catchment and their flow was assigned to the pipe segment's upstream manhole. The total number of sub-catchments in the sanitary model is 283. A catchment map is provided as ***Figure 6.4***.

The catchment assigned to each pipe segment included all sub-catchments upstream of the pipe segment plus any catchments attached to the pipe segment. Sanitary flows for each catchment were determined based on the populations and the sanitary flow information previously identified.

Lot attributes, including lot area and sanitary sewer connection location, were obtained from the City's GIS database.

6.2 Design Criteria & Analysis

6.2.1 Evaluation of Existing Sanitary Mains

Existing sanitary mains were evaluated for capacity based on the following criteria from the City of Surrey Engineering Design Criteria Manual (May 2004):

- Local sewers must not have a flow that exceeds 70% of full pipe capacity ($Q_d/Q_f \leq 0.70$) or a depth exceeding 62% of the internal diameter of the sewer; and,
- Interceptor and trunk sanitary mains shall not have a flow that exceeds 83.6% of full pipe capacity ($Q_d/Q_f \leq 0.836$) or a depth exceeding 70% of the internal diameter of the sewer.

6.2.2 Design Criteria for New Sewers

Design criteria for replacement or new sewers as per the City of Surrey Engineering Design Criteria Manual (May 2004, with updates) were as follows:

- Local sewers are designed as open channels with depth of flow, under maximum design flow conditions, not exceeding 50% of full pipe capacity ($Q_d/Q_f \leq 0.50$) or a depth exceeding 50% of the internal diameter of the sewer;
- Interceptor and trunk sewers are designed such that flow under maximum design flow conditions does not exceed 83.6% of full pipe capacity ($Q_d/Q_f \leq 0.836$) or have a depth that does not exceed 70% of the internal diameter of the sewer;
- Minimum sewer sizes are:
    - 200 mm diameter – for single family residential lands, and all other zoned lands with less than 90 ppha,
    - 250 mm diameter – for non-residential zones, residential zones, and all other zoned lands equal to or more than 90 ppha,
    - Minimum sewer sizes above also applies to the frontal sewer for the development that has existing sewer,
    - For new extensions, no reduction in pipe size shall be made for pipes downstream, irrespective of grade provided on the pipe, unless specifically approved, in writing, by the Engineer;
- Nominal depth of sewers are to be between 2.0 meters and 3.5 meters;
- The terminal section of sanitary sewer, servicing 6 or less house service connections, shall have a minimum grade of 1.0%;
- A sanitary sewer, servicing the 7^{th} to 12^{th} house service connections, shall have a grade of 0.6% or greater;
- A sanitary sewer, servicing the 13^{th} house service connection (or more), shall have a grade of 0.5% or greater; and
- Pipe grades less than 0.5% may only be used once peak wet weather flow produces a flow velocity in excess of 0.6 m/s, accounting for dynamics of partial pipe flow

6.3 Servicing Options & Proposed System

6.3.1 City Centre Sanitary Sewer Capacity Deficiencies

The design flow (Q_d) was calculated for each pipe in the City Centre sanitary pipe network for existing (2013), 2023, 2033 and 2083 Sewer Equivalent Build Out scenarios. The Q_d was compared to the full pipe capacity (Q_f) and evaluated against the design criteria. A summary of pipelines with identified hydraulic deficiencies is tabulated below in ***Table 6.3*** and is presented graphically in ***Figure 6.5***.

Table 6.3 Sanitary Sewer Base Scenario Capacity Deficiencies

Existing Sanitary Pipe Diameter (mm)	2013 (m)	2023 (m)		2033 (m)		2043 (m)		BO (m)	
		Phasing	Cumulative	Phasing	Cumulative	Phasing	Cumulative	Phasing	Cumulative
100	46	0	46	0	46	0	46	0	46
150	515	112	627	899	1,526	390	1,915	2,078	3,993
200	2,932	3,757	6,689	2,321	9,010	2,314	11,324	5,008	16,332
250	293	12	305	314	619	94	713	6	719
300	468	0	468	340	808	0	808	212	1,020
350	0	0	0	0	0	39	39	457	496
450	9	198	207	120	327	192	520	41	561
525	0	0	0	0	0	114	114	402	517
600	0	0	0	113	113	4	117	42	159
675	0	0	0	15	15	0	15	5	20
750	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0
TOTAL	**4,264**	**4,079**	**8,343**	**4,122**	**12,465**	**3,147**	**15,612**	**8,253**	**23,864**
Pump Stations and Forcemains	-	1 additional pump required at Quibble Creek PS		Twin 1,598 m of existing 500 mm forcemain with 675 mm		-		Twin 718 m of existing 600 mm forcemain with 600 mm	

6.3.2 City Centre Sanitary Sewer Improvement Scenarios

A number of sanitary sewer diversion scenarios were developed and compared to the base option of simply upsizing pipes that become undersized in the future as per ***Table 6.3***. The following includes a description of benefits accrued through the recommended diversions.

6.3.2.1 132 Street Diversion

This scenario diverts the sanitary gravity main on 132 Street into the sanitary gravity main on 104 Avenue. It avoids future capacity problems and associated improvements for 745 m of the sanitary gravity main on 132 Street north of 104 Avenue.

To accommodate the connection of the 132 Street gravity main the 104 Avenue gravity main must be lowered from 133A Street for 160 m west to 133 Street. These pipes are identified as requiring capacity upgrades in the future with or without the connection of the 132 Street gravity main, therefore the diversion project can financially "piggy back" on the capacity upgrade.

6.3.2.2 Hilton Road Diversion

The Hilton Road Diversion connects the sewers on Bentley Road between Hilton Road and 136 Street. This diversion allows the sewers on Hilton Road and Bentley Road to flow to the interceptor on King George Blvd via Bentley Road rather than the longer existing 136 Street route. The Hilton Road diversion reduces flows in the 136th Street gravity main, reducing the long term capacity improvements required for the 136th Street gravity main and those mains downstream of the 136th Street gravity main.

6.3.2.3 100 Avenue Diversion

The existing sanitary system includes a split flow manhole (# 6961) on 100 Avenue west of 138A Street. This split currently directs 75% of the flow to sanitary catchment N14 and 25% of the flow north to catchment N04. The split flow directed to sanitary catchment N14 is ultimately pumped by the Quibble Creek Pump Station into a gravity interceptor at 102 Avenue and City Parkway. The split flow directed to sanitary catchment N04 flows by gravity to the interceptor at 105A Avenue and University Dr.

The current flow split allows the City to avoid some pumping energy costs through utilization of the gravity network north of the split flow manhole. As flows increase due to growth, neither network will be able to accommodate the flow increase without significant improvements.

To address this, three sub-options for 100 Avenue were analyzed:

- 100% of flow to Quibble Creek Pump Station (Quibble Diversion);
- 100% of flow north by gravity to the sanitary interceptor (Northern Diversion); and
- 100% of flow to Quibble Creek Pump Station until 2029, then 100% of flow to the north (Northern Variant).

Due to higher capital costs (approximately $0.5M), the Northern Diversion and Northern Variant were deemed less desirable than the Quibble Diversion option.

The existing Quibble Pump Station is currently equipped with 3 (2 duty and 1 standby) pumps and has room for one additional pump which will increase the capacity of the pump station. Pump and system curves are provided in ***Appendix A***. An NPV analysis of the Base and Quibble Diversion options for the flow in the 100 Avenue main was also completed and it was found that the Quibble Diversion option offered both capital cost and NPV benefits.

6.3.3 Proposed System

It is recommended that the 132 Street Diversion, Hilton Road Diversion, and 100 Avenue Diversion (Quibble Diversion) scenarios outlined in ***Section 6.3.2*** are implemented. ***Table 6.4*** shows that the Recommended Option reduces the total length of sewer upgrades required by 2,619m and reduces the capital cost of required upgrades by approximately $4.0M when compared to the Base Option.

Table 6.4 Scenario Comparison

Scenario	Total Length of Sewer Upgrades Required (m)	Capital Cost
Base Option	23,864	$34,770,033
Recommended Option	21,245	$30,723,541

**Does not include pump station costs*
^Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency

Figures 6.6 – 6.11 show the recommended system upgrades for each of the phases of development and ***Table 6.5*** lists the corresponding gravity infrastructure costs by phase. All sewer capacity upgrade costs where predicted design flows are equal to or greater than 40L/s, and the incremental sewer main upsizing costs from the required base size, are DCC eligible costs.

Table 6.5 Gravity Infrastructure Costs by Phase

Phase	Total Length of Sewer Upgrades Required (m)	Capital Cost	DCC Eligible Cost
Existing	2,562	$3,915,884	$3,333,094
2023	3,281	$5,060,106	$3,522,612
2033	4,004	$5,897,663	$3,433,101
2043	2,996	$4,366,724	$3,126,228
Build Out	8,402	$11,483,164	$4,976,800
Total	**21,245**	**$30,723,541**	**$18,391,835**

^Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency

Table 6.6 lists the pump station and forcemain costs by phase. All pump station and forcemain costs are DCC eligible.

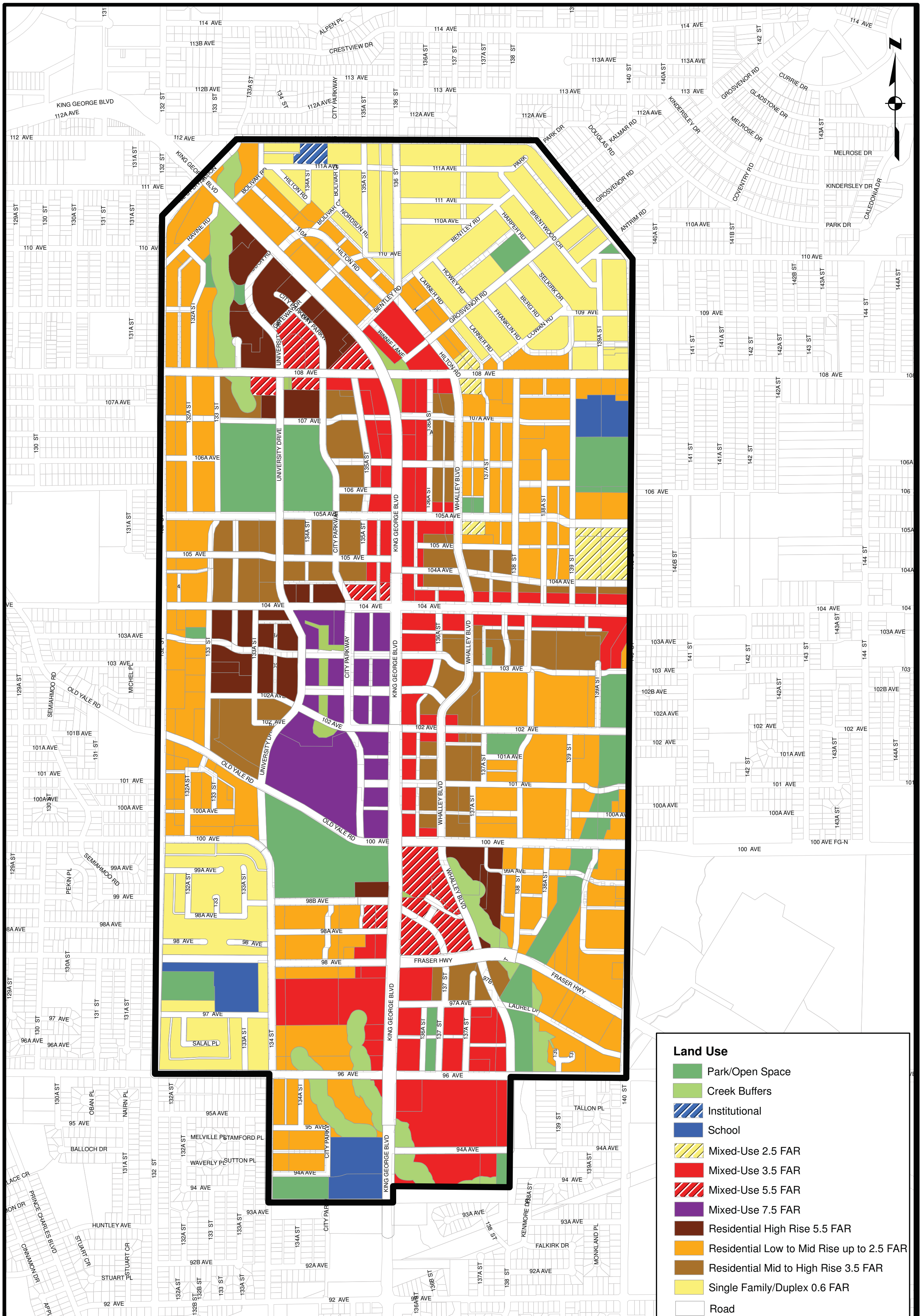
Table 6.6 Pump Station and Forcemain Costs by Phase

Recommended Improvements	Upgrade Year	Unit Cost	Capital Cost	DCC Cost
Add 1 – 225 L/s pump to Quibble Creek Pump Station (4th Pump) for a firm capacity of 347L/s	2019	$110,000	$110,000	$110,000
Twin 1,598 m of 500 mm diameter forcemain with 675mm diameter from the pump station along 94A Ave – 138 St ending at 100 Ave/Whalley Blvd.	2030	$2,125	$3,395,750	$3,395,750
Twin 718 m of 600mm diameter forcemain with 600mm diameter at 100 Ave/Whalley Blvd -102 Ave – 102 Ave/City Pkwy.	2073	$1,950	$1,400,100	$1,400,100
		Total	$4,905,850	$4,905,850

6.4 10 - Year Servicing Plan

DCC eligible projects total $23,297,685. The pump installation in the Quibble Creek Pump Station is the only project included in the 2014 – 2023 10 Year Servicing Plan. It is recommended that all of the DCC eligible projects be included in future 10 Year Servicing Plans.

A detailed schedule of recommended sewer system improvements is tabulated in ***Appendix A*** including existing infrastructure description, new infrastructure description, estimated implementation date, cost, and 10 Year Servicing Plan Project ID number.



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City Centre Plan 2013 Update
Utility Servicing Strategy

Project No.	Date
60278179	August 2013

Legend

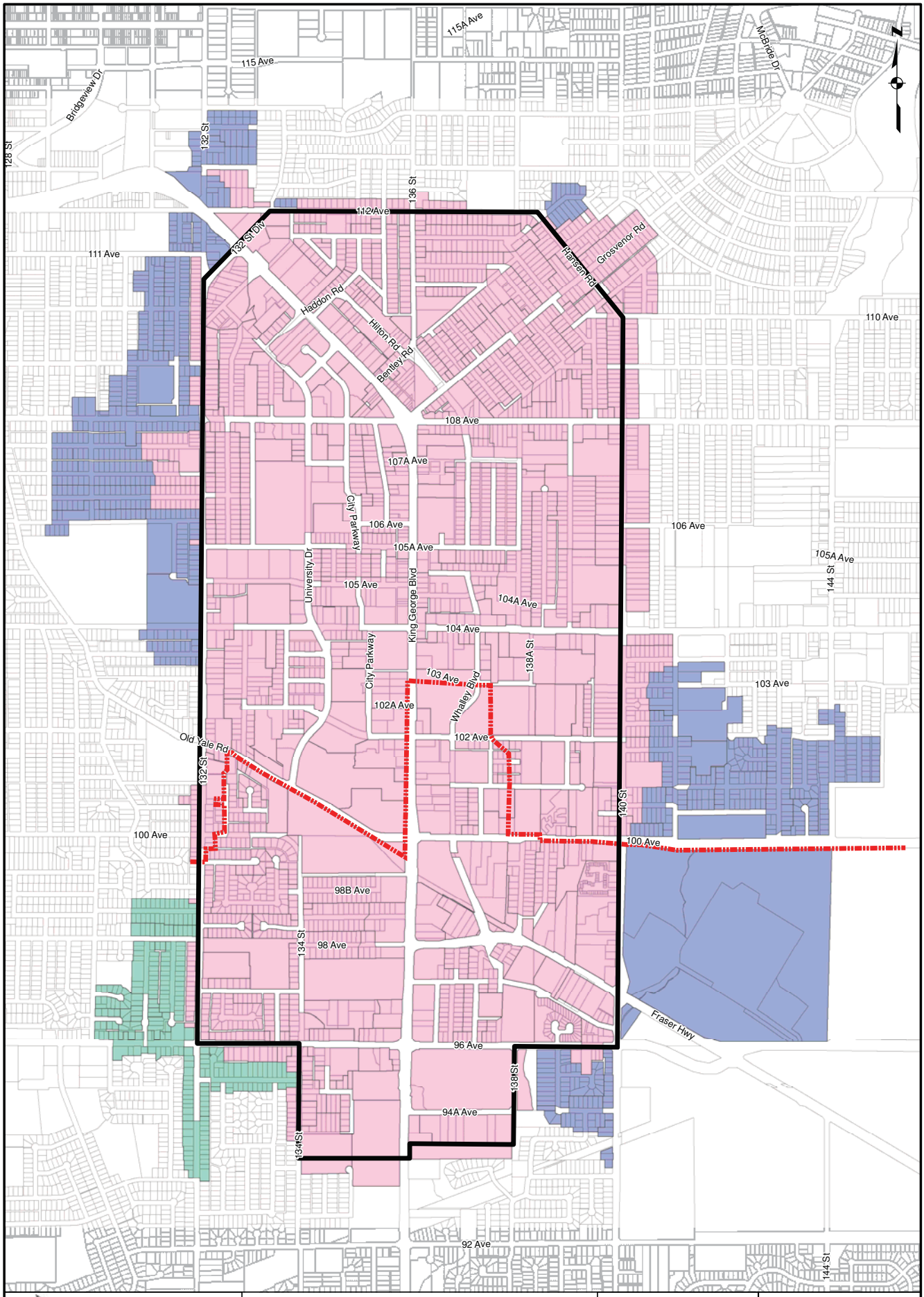
City Centre Boundary

AECOM

200 100 0 200 Meters

City Centre Plan
(Build-Out)

FIGURE 6.1



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Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

- City Centre Boundary
- North - South Sanitary Catchment Boundary

Catchment Area

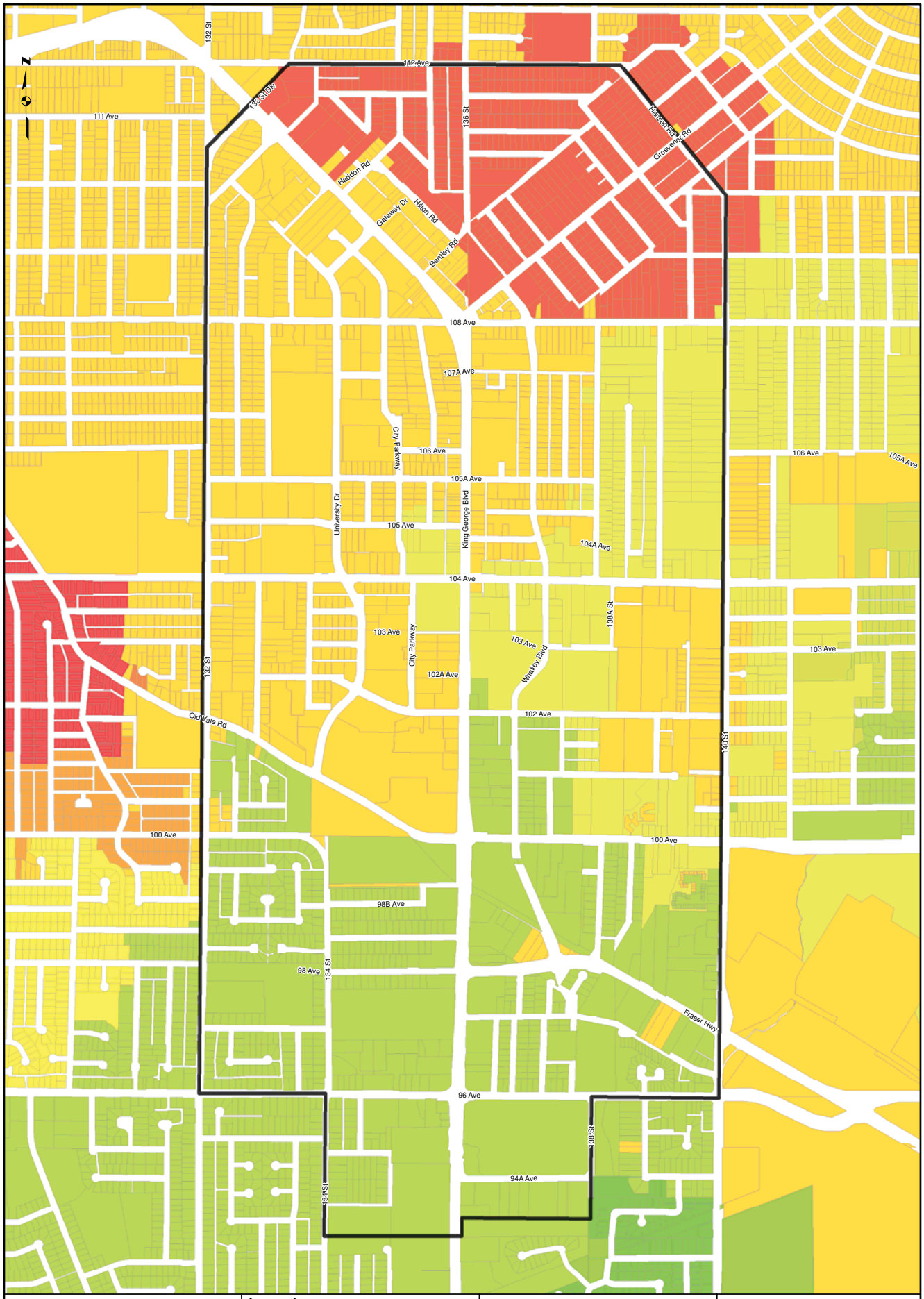
- Internal
- External 1
- External 2

AECOM

0 100 200 400 Meters

Sanitary Catchments

FIGURE 6.2



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

City Centre Boundary

Infiltration Rates
L/Ha/Day

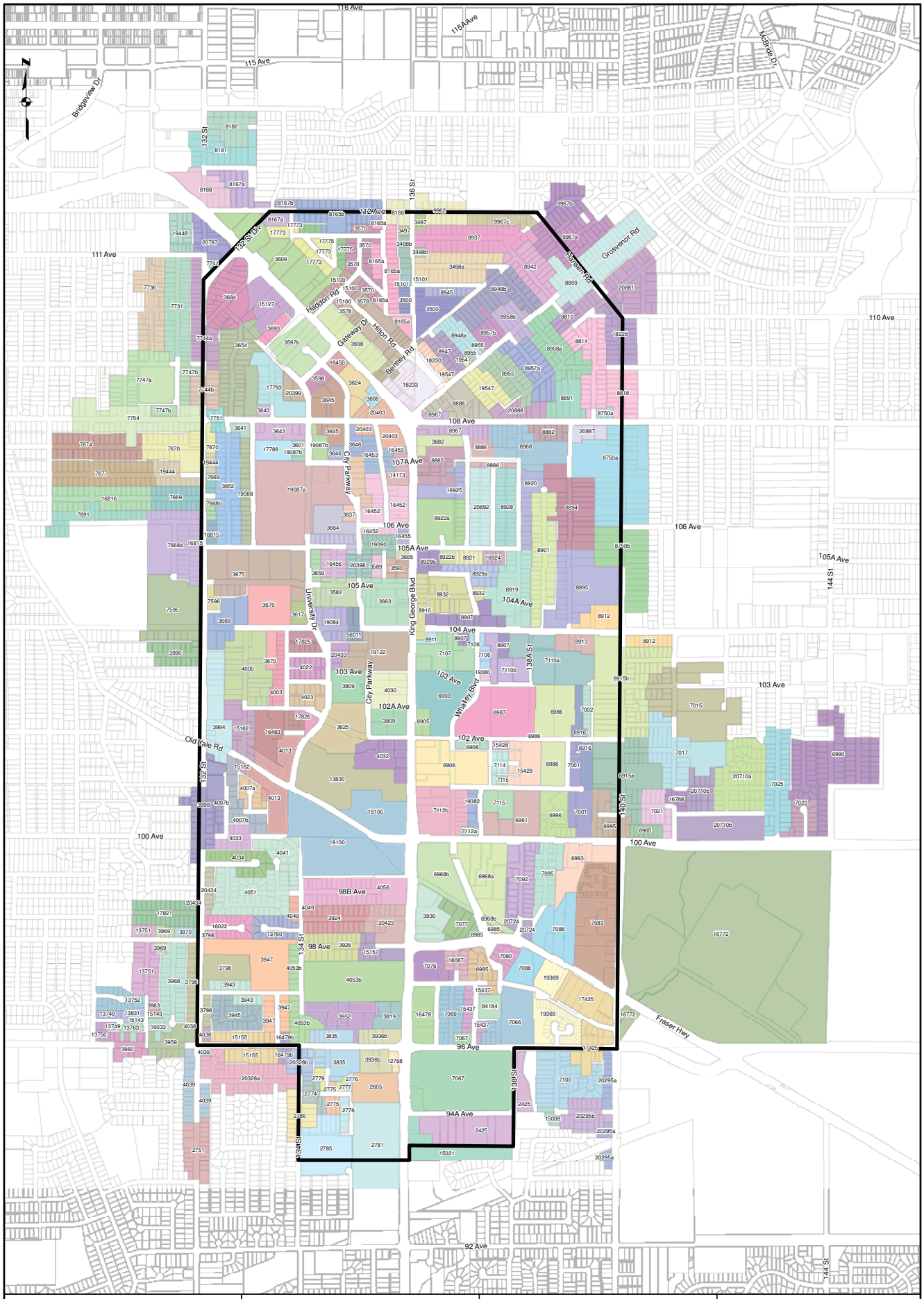
9,947	24,031
11,975	28,940
15,600	30,000
17,574	39,594
17,808	40,062
	61,536
	122,077

AECOM

0 50 100 200 300 400 500 Meters

Inflow and Infiltration Rates

FIGURE 6.3



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

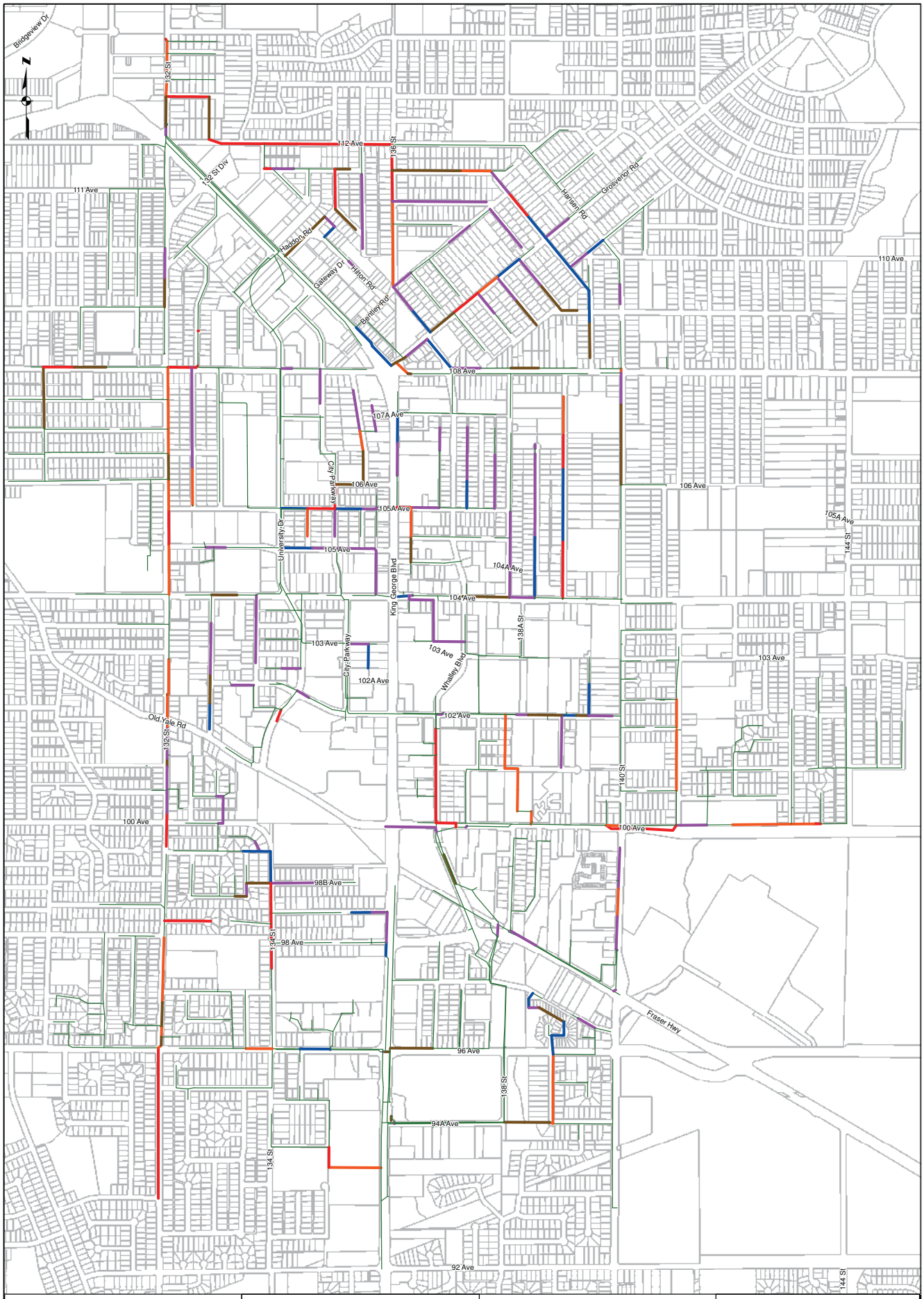
City Centre Boundary

AECOM

0 50 100 200 300 400 500 Meters

Sanitary Sub-Catchments

FIGURE 6.4



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

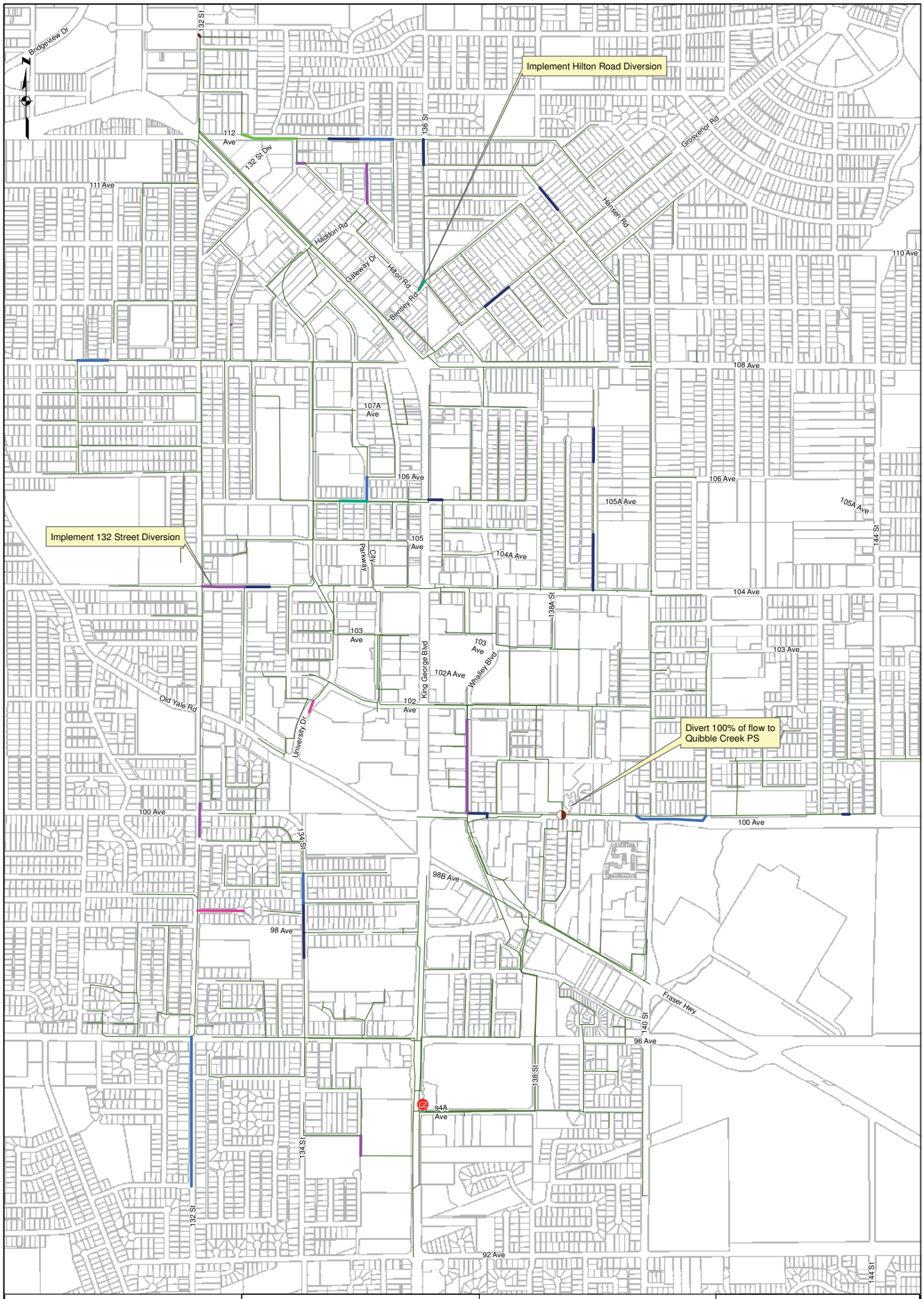
Upgrade Year
- 2013
- 2023
- 2033
- 2043
- 2083
- No Upgrade Required

AECOM

0 50 100 200 300 400 500 Meters

Base Scenario without Diversions Sanitary Pipelines with Hydraulic Deficiencies 2013 - 2083 MBO

FIGURE 6.5



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

Pipe Upgrades
- 200
- 250
- 300
- 375
- 450
- 525
- 600
- 675
- 750
- 900

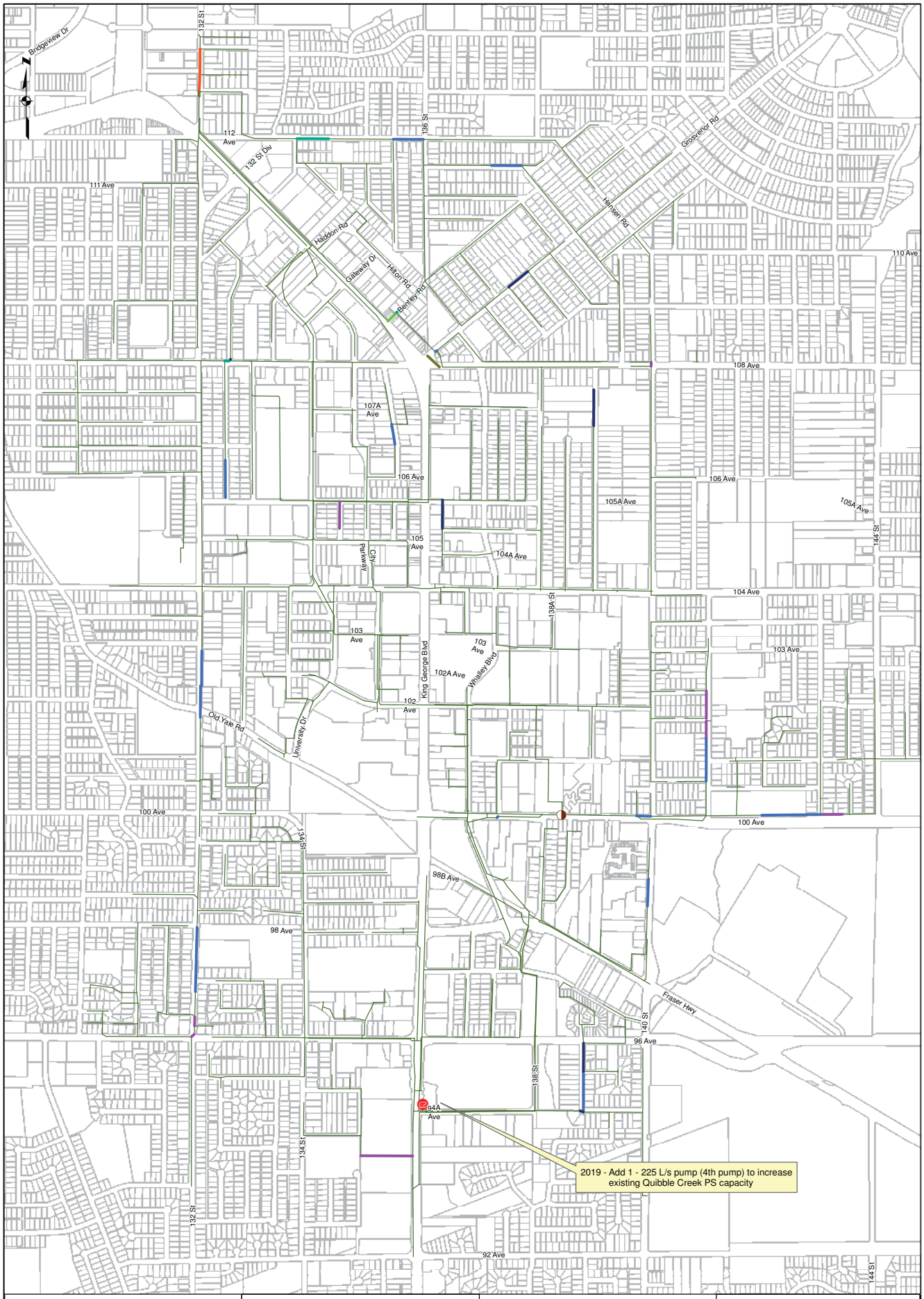
- Sanitary Network
- Quibble Creek Pump Station
- Split Flow Manhole

AECOM

0 50 100 200 300 400 500 Meters

2013 Recommended Sanitary Capacity Upgrades

FIGURE 6.6



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

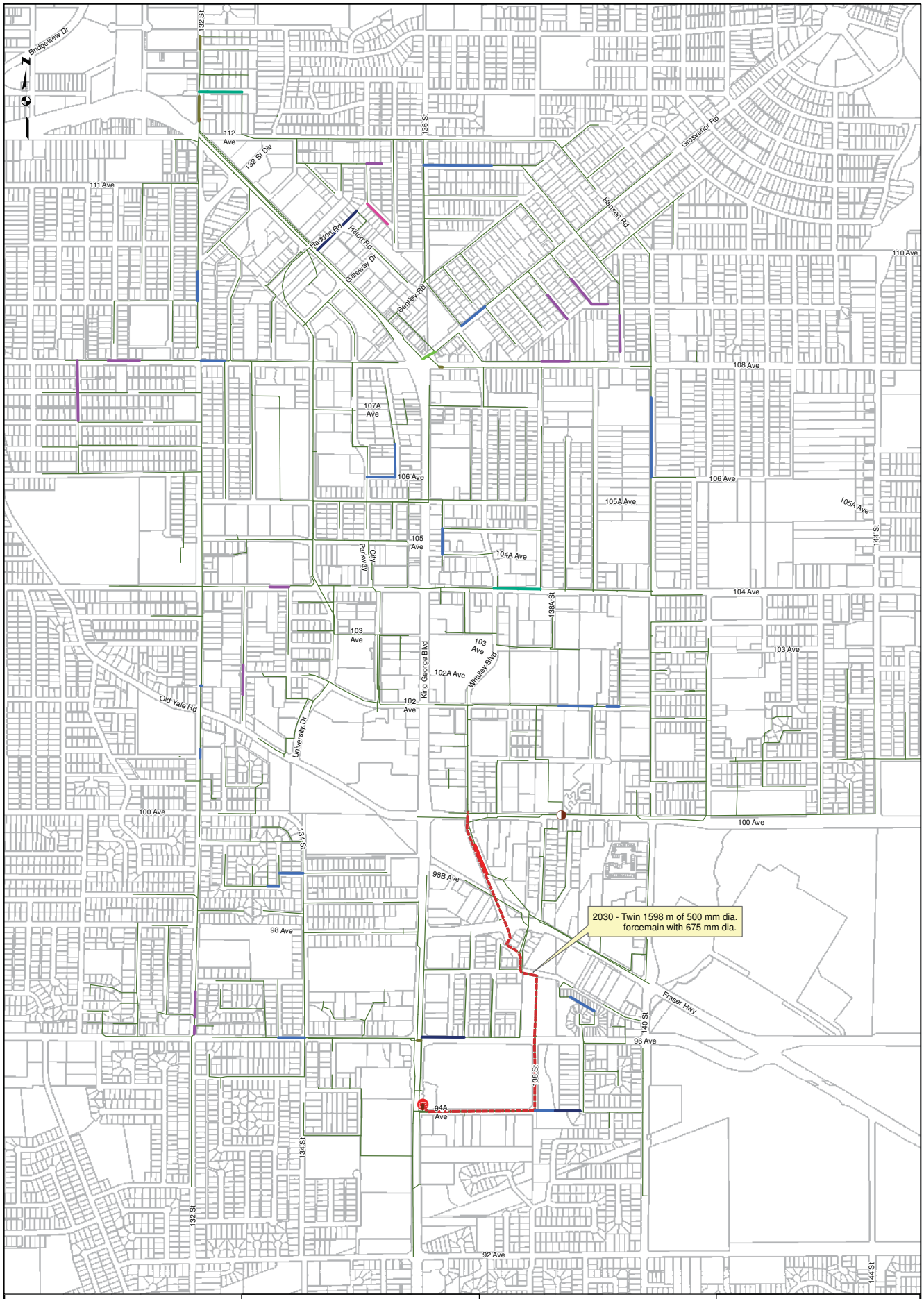
Upgrade Year		
200	525	Sanitary Network
250	600	Quibble Creek Pump Station
300	675	Split Flow Manhole
375	750	
450	900	

AECOM

0 50 100 200 300 400 500 Meters

2014 - 2023 Recommended Sanitary Capacity Upgrades

FIGURE 6.7



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Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

Pipe Upgrades
- 200
- 250
- 300
- 375
- 450
- 525
- 600
- 675
- 750
- 900

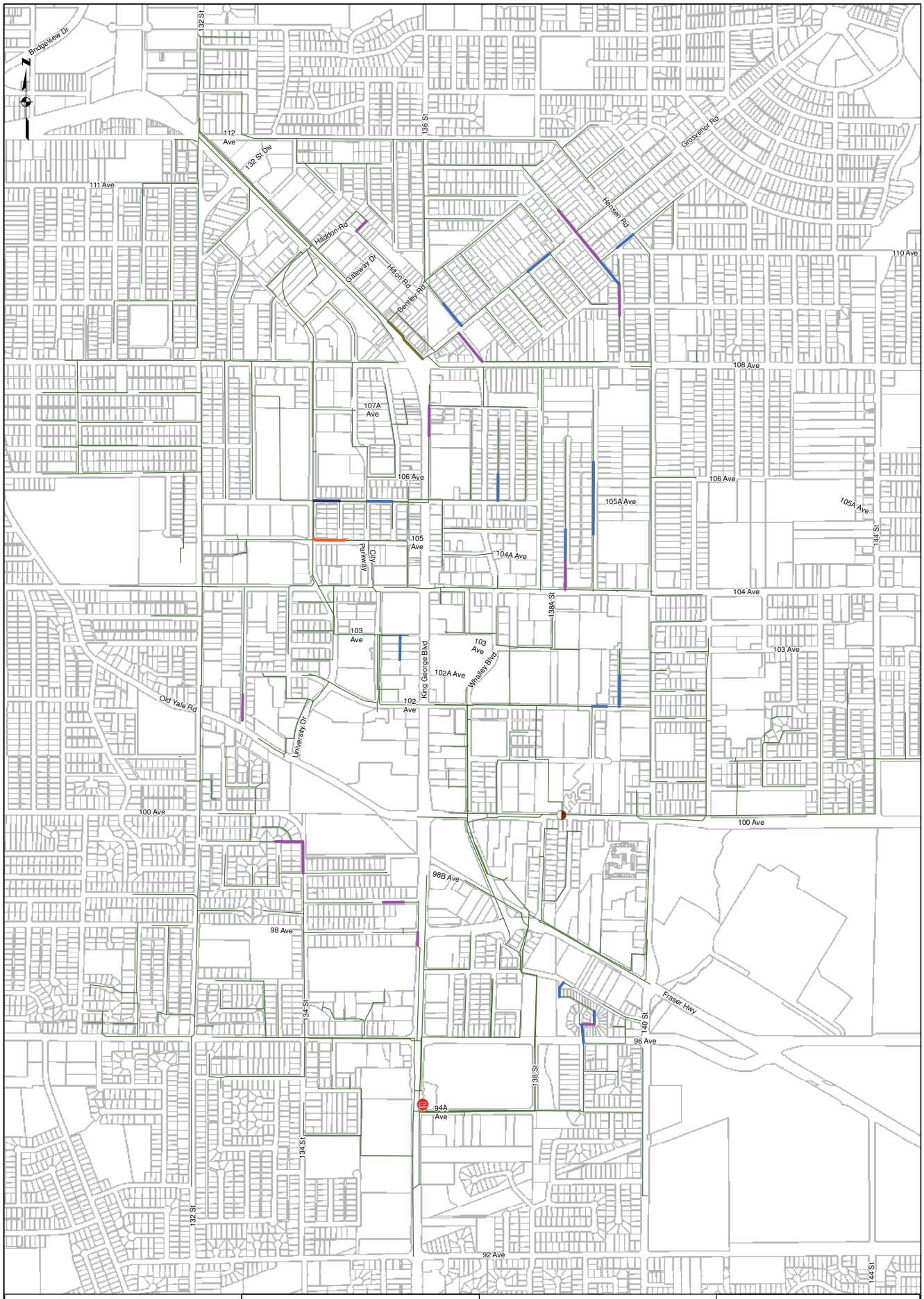
- Forcemain Upgrade
- Sanitary Network
- Quibble Creek Pump Station
- Split Flow Manhole

AECOM

0 50 100 200 300 400 500 Meters

2024 - 2033 Recommended Sanitary Capacity Upgrades

FIGURE 6.8



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

Pipe Upgrades
- 200
- 250
- 300
- 375
- 450
- 525
- 600
- 675
- 750
- 900

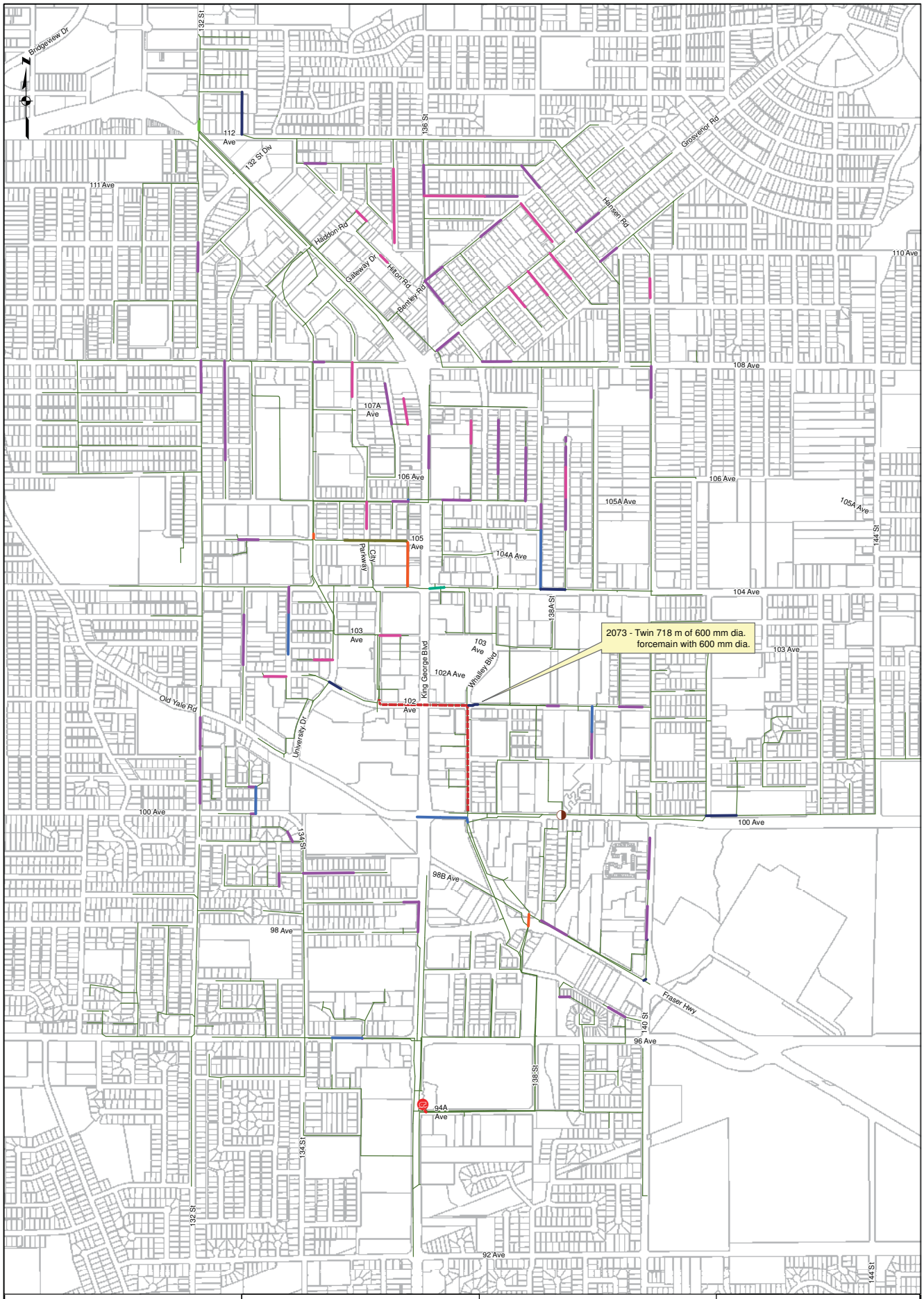
Sanitary Network
Quibble Creek Pump Station
Split Flow Manhole

AECOM

0 50 100 200 300 400 500 Meters

2034 - 2043 Recommended Sanitary Capacity Upgrades

FIGURE 6.9



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No: 60278179
Date: July 2014

Legend

Pipe Upgrades
- 200
- 250
- 300
- 375
- 450
- 525
- 600
- 675
- 750
- 900

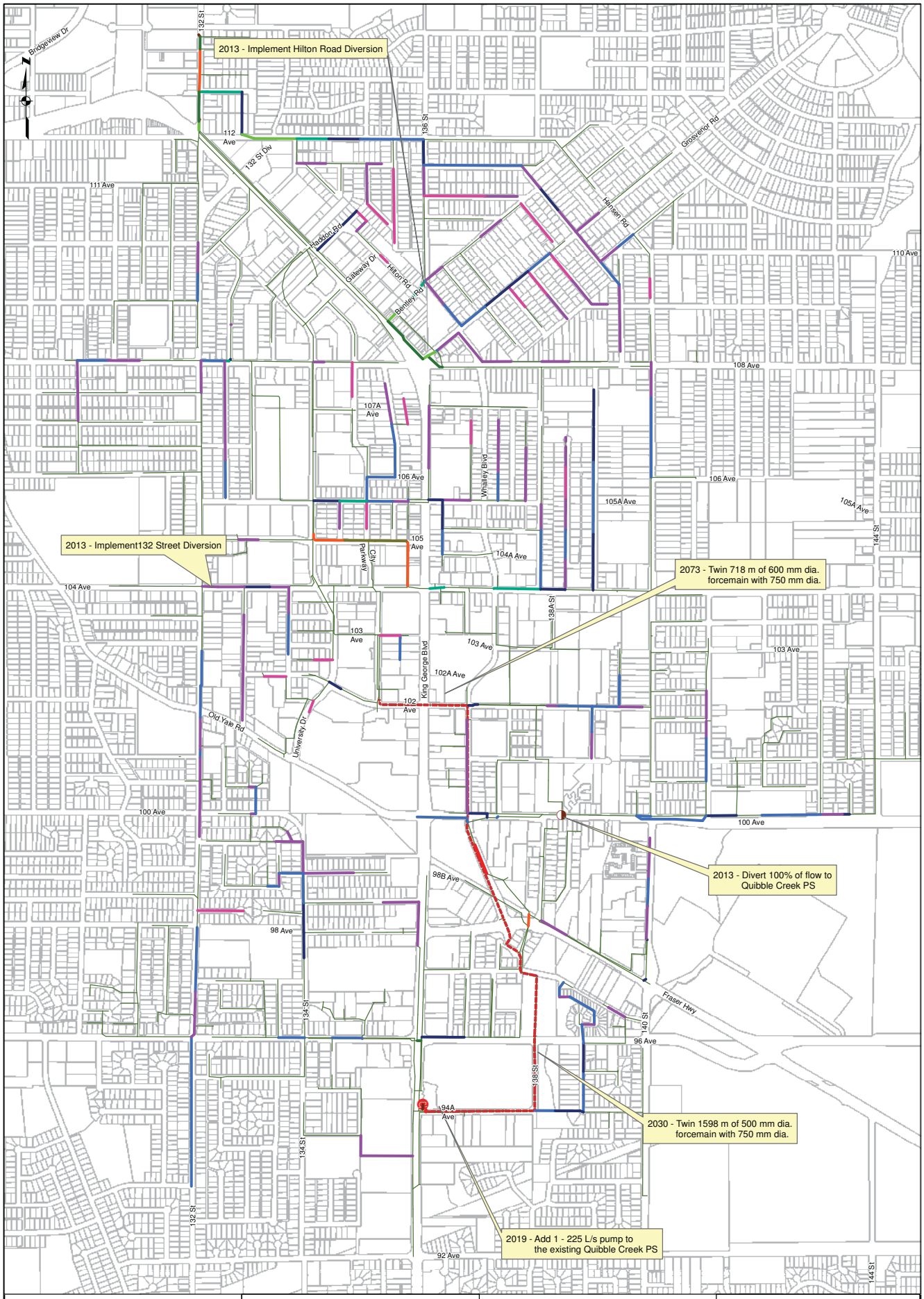
Forcemain Upgrade
Sanitary Network
Quibble Creek Pump Station
Split Flow Manhole

AECOM

0 50 100 200 300 400 500 Meters

2044 - MBO Recommended Sanitary Capacity Upgrades

FIGURE 6.10



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No: 60278179
Date: July 2014

Legend

Pipe Upgrades
200
250
300
375
450
525
600
675
750
900
Forcemain Upgrade
Sanitary Network
Quibble Creek Pump Station
Split Flow Manhole

AECOM

0 60 120 240 360 480 600 Meters

2013 - MBO Recommended Sanitary Capacity Upgrades

FIGURE 6.11

APPENDIX A: SANITARY DETAILS

- ☐ 2013 Population Horizon
- ☐ 2023 Population Horizon
- ☐ 2033 Population Horizon
- ☐ 2043 Population Horizon
- ☐ Build Out Year 2083 - Sewer Equivalent Build Out Population Horizon
- ☐ 2013 Gravity Sewer Capacity Upgrades
- ☐ 2014 - 2023 Gravity Sewer Capacity Upgrades
- ☐ 2024 - 2033 Gravity Sewer Capacity Upgrades
- ☐ 2034 - 2043 Gravity Sewer Capacity Upgrades
- ☐ 2044 - BO Gravity Sewer Capacity Upgrades
- ☐ DCC Eligible Gravity Main Projects
- ☐ DCC Eligible Gravity Main Upsizing Projects
- ☐ DCC Eligible Pump Station and Forcemain Projects
- ☐ Quibble Creek Pump Station System Curve
- ☐ Sanitary Sub-Catchments Load Assignment
- ☐ City Centre Projected Growth Areas for Development Staging Scenarios

A1. 2013 Population Horizon

Internal residential and commercial populations are generated as previously described in Part 6. Institutional facilities along with their population equivalence are listed in ***Table 1***.

Table 1 2013 Internal Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	500 beds	900 L/bed/d	1,286
Laurel Place Retirement Home	191 beds	650 L/bed/d	355
Forsyth Road Elementary School	271 students	45 L/student/d	35
AHP Mathew Elementary School	426 students	45 L/student/d	55
Queen Elizabeth Secondary School	1435 students	90 L/student/d	369
Cherington Place Retirement Home	75 beds	650 L/bed/d	139
		Total =	**2,239**

External residential populations are generated as previously described in Part 6, and there is no commercial component. External institutional facilities are listed in ***Table 2*** with their population equivalents. For the existing Simon Fraser University (SFU), there are no residents living in this facility and only students and teachers are present. As such, the SFU population has already been accounted for in the 7.5 FAR where future residential and apartments may be built.

Table 2 2013 External Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Jim Pattison Outpatient Care & Surgery Centre	1,600 patients	125 L/patient/d	571
RCMP E-Division	3,000 employees	94.5 L/employee/d	810
Discovery Elementary School	104 students	45 L/student/d	13
KB Woodward Elementary School	475 students	45 L/student/d	61
Kwantlen Park Secondary School	1,495 students	90 L/student/d	384
Lena Shaw Elementary School	530 students	45 L/student/d	68
		Total =	**1,907**

Table 3 summarizes the 2013 existing sanitary populations for internal and external catchments.

Table 3 2013 Total Sanitary Equivalent Population

Category	Internal	External 1	External 2	**Total**
2013 Residential	33,812	5,645	980	**40,437**
2013 Commercial	6,368	0	0	**6,368**
2013 Institutional	2,239	1,907	0	**4,146**
2013 Total =	**42,419**	**7,552**	**980**	**50,951**

A2. 2023 Population Horizon

Internal residential and commercial populations are generated as previously described in Part 6. Internal institutional facilities along with their population equivalence are listed in ***Table 4.***

Table 4 2023 Internal Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	650 beds	900 L/bed/d	1,671
Laurel Place Retirement Home	191 beds	650 L/bed/d	355
Forsyth Road Elementary School	350 students	45 L/student/d	45
AHP Mathew Elementary School	550 students	45 L/student/d	71
Queen Elizabeth Secondary School	1854 students	90 L/student/d	477
Cherington Place Retirement Home	75 beds	650 L/bed/d	139
		Total =	**2,758**

External residential populations are generated as previously described in Part 6, and there is no commercial component. Institutional facilities are listed in ***Table 5*** with their population equivalents. For the existing Simon Fraser University (SFU), there are no residents living in this facility and only students and teachers are present. As such, the SFU population has already been accounted for in the 7.5 FAR where future residential and apartments may be built.

Table 5 2023 External Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Jim Pattison Outpatient Care & Surgery Centre	1,830 patients	125 L/patient/d	654
RCMP E-Division	3,050 employees	94.5 L/employee/d	824
Discovery Elementary School	134 students	45 L/student/d	17
KB Woodward Elementary School	614 students	45 L/student/d	79
Kwantlen Park Secondary School	1,932 students	90 L/student/d	497
Lena Shaw Elementary School	685 students	45 L/student/d	88
		Total 2023 External Institutional Pop. =	**2,159**

Table 6 summarizes the 2023 sanitary populations for internal and external catchments.

Table 6 2023 Total Sanitary Population

Category	Internal	External 1	External 2	**Total**
2023 Residential	52,442	9,203	1,528	**63,173**
2023 Commercial	7,471	0	0	**7,471**
2023 Institutional	2,758	2,159	0	**4,917**
2023 Total =	**62,671**	**11,362**	**1,528**	**75,561**

A3. 2033 Population Horizon

Internal residential and commercial populations are generated as previously described in Part 6. Internal institutional facilities along with their population equivalence are listed in ***Table 7***.

Table 7 2033 Internal Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	800 beds	900 L/bed/d	2,057
Laurel Place Retirement Home	191 beds	650 L/bed/d	355
Forsyth Road Elementary School	437 students	45 L/student/d	56
AHP Mathew Elementary School	686 students	45 L/student/d	88
Queen Elizabeth Secondary School	2,312 students	90 L/student/d	595
Cherington Place Retirement Home	75 beds	650 L/bed/d	139
		Total =	**3,290**

External residential populations are generated as previously described in Part 6, and there is no commercial component. External Institutional facilities are listed in ***Table 8*** with their population equivalents. For the existing Simon Fraser University (SFU), there are no residents living in this facility and only students and teachers are present. As such, the SFU population has already been accounted for in the 7.5 FAR where future residential and apartments may be built.

Table 8 2033 External Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Jim Pattison Outpatient Care & Surgery Centre	2,100 patients	125 L/patient/d	750
RCMP E-Division	3,100 employees	94.5 L/employee/d	837
Discovery Elementary School	168 students	45 L/student/d	22
KB Woodward Elementary School	765 students	45 L/student/d	98
Kwantlen Park Secondary School	2,408 students	90 L/student/d	619
Lena Shaw Elementary School	854 students	45 L/student/d	110
	Total 2033 External Institutional Pop. =		**2,436**

Table 9 summarizes the 2033 sanitary populations for internal and external catchments.

Table 9 2033 Total Sanitary Population

Category	Internal	External 1	External 2	**Total**
2033 Residential	71,858	11,217	1,862	**84,937**
2033 Commercial	8,730	0	0	**8,730**
2033 Institutional	3,290	2,436	0	**5,726**
2033 Total =	**83,878**	**13,653**	**1,862**	**99,393**

A4. 2043 Population Horizon

Internal residential and commercial populations are generated as previously described in Part 6. Internal institutional facilities along with their population equivalence are listed in ***Table 10***.

Table 10 2043 Internal Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	800 beds	900 L/bed/d	2,057
Laurel Place Retirement Home	191 beds	650 L/bed/d	355
Forsyth Road Elementary School	488 students	45 L/student/d	63
AHP Mathew Elementary School	766 students	45 L/student/d	98
Queen Elizabeth Secondary School	2,581 students	90 L/student/d	664
Cherington Place Retirement Home	75 beds	650 L/bed/d	139
		Total =	**3,376**

No future residential population information is available for the external catchments beyond 2033. Therefore the 2033 external 1 and external 2 area residential populations were maintained as the Sewer Equivalent Build Out external residential populations. ***Table 11*** summarizes the external institutional populations. For the existing Simon Fraser University (SFU), there are no residents living in this facility and only students and teachers are present. As such, the SFU population has already been accounted for in the 7.5 FAR where future residential and apartments may be built.

Table 11 2043 External Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Jim Pattison Outpatient Care & Surgery Centre	2,300 patients	125 L/patient/d	821
RCMP E-Division	3,150 employees	94.5 L/employee/d	851
Discovery Elementary School	187 students	45 L/student/d	24
KB Woodward Elementary School	854 students	45 L/student/d	110
Kwantlen Park Secondary School	2,689 students	90 L/student/d	691
Lena Shaw Elementary School	953 students	45 L/student/d	123
		Total =	**2,620**

Table 12 summarizes the 2043 sanitary populations for internal and external catchments.

Table 12 2043 Total Sanitary Population

Category	Internal	External 1	External 2	**Total**
2043 Residential	92,106	11,217	1,862	**105,185**
2043 Commercial	10,190	0	0	**10,190**
2043 Institutional	3,376	2,620	0	**5,996**
2043 Total =	**105,672**	**13,837**	**1,862**	**121,371**

A5. Build Out Year 2083 - Sewer Equivalent Build Out Population

Build Out Internal Population

For residential population, the Build Out internal population is based on FAR and areas from the City Centre Plan. The plan identifies floor area ratios (FAR's) for residential and commercial usage in City Centre. Residential floor space was converted to population based on the figures in ***Table 13*** below.

Table 13 Residential Occupancy Based on FAR

FAR		People Per Unit
Low	High	
0.6	0.6	3.75 (main dwelling) + 1.93 (secondary suite) = **5.68**
2.5	2.5	**2.8**
>2.5	7.5	**1.8**

For some parcels, the residential or commercial populations were higher in the interim scenarios than in the Build Out scenario. In these cases, the highest residential population was added to the highest commercial equivalent population from any scenario to form the Build Out Scenario. The build out year is recommended for sanitary sewer sizing because of the long service life and high installation costs of sanitary infrastructure.

Institutional facilities along with their population equivalence are listed in ***Table 14.*** Institutional bed and student estimates were provided by the City and School District respectively. As per the City's 2004 Design Criteria Manual, average dry weather flow (ADWF) of 350 l/c/d was applied.

Table 14 Build Out Internal Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	800 beds	900 L/bed/d	2,057
Laurel Place Retirement Home	191 beds	650 L/bed/d	355
Forsyth Road Elementary School	813 students	45 L/student/d	105
AHP Mathew Elementary School	1,278 students	45 L/student/d	164
Queen Elizabeth Secondary School	4,305 students	90 L/student/d	1,107
Cherington Place Retirement Home	75 beds	650 L/bed/d	139
		Total =	**3,927**

For the existing Simon Fraser University (SFU), there are no residents living in this facility and only students and teachers are present. As such, the SFU population has already been accounted for in the 7.5 FAR where future residential and apartments may be built.

Build Out External Population

No future residential population information is available for the external catchments beyond 2033. Therefore the 2033 external 1 and external 2 area residential populations were maintained as the build out external residential populations. ***Table 15*** summarizes the external institutional populations.

Table 15 Build Out External Institutional Sanitary Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Jim Pattison Outpatient Care & Surgery Centre	3,200 patients	125 L/patient/d	1,143
RCMP E-Division	3,200 employees	94.5 L/employee/d	864
Discovery Elementary School	312 students	45 L/student/d	40
KB Woodward Elementary School	1,425 students	45 L/student/d	183
Kwantlen Park Secondary School	4,485 students	90 L/student/d	1,153
Lena Shaw Elementary School	1,590 students	45 L/student/d	204
Total BO External Institutional Population			**3,587**

Build Out Total Sanitary Population

Table 16 summarizes the Sewer Equivalent Build Out sanitary populations for internal and external catchments.

Table 16 Sewer Equivalent Build Out Total Sanitary Population

Category	Internal	External 1	External 2	**Total**
Build Out Residential	160,599	11,217	1,862	**173,678**
Build Out Commercial	15,274	0	0	**15,274**
Build Out Institutional	3,927	3,587	0	**7,514**
Sewer Equivalent BO Total	**179,800**	**14,804**	**1,862**	**196,466**

A6. Existing Gravity Sewer Capacity Upgrades

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	132 St. Diversion, 104 Ave. at 132 St.	-	-	-	-	2013	57	250	$1,313	$74,813	$74,813
-	Hilton Rd. Diversion, Bentley Rd. at Hilton Rd.	-	-	-	-	2013	39	450	$1,763	$68,738	$68,738
-	100 Ave. (Quibble) Diversion	-	-	-	-	2013	-	-	$3,000	$3,000	$3,000
-	100 Ave. at 140 St.	1000088338	200	PVC	1989	2013	22	300	$1,413	$30,911	$30,911
-	100 Ave. at 140 St.	1000088339	200	PVC	1989	2013	102	300	$ 1,413	$144,312	$144,312
-	100 Ave. at 140 St.	1000088340	200	PVC	1989	2013	119	300	$ 1,413	$167,382	$167,382
-	100 Ave. at 140 St.	1000088341	200	PVC	1989	2013	21	300	$1,413	$ 29,265	$29,265
-	100 Ave. at Whalley Blvd.	1000088319	250	AC	1966	2013	14	375	$1,591	$ 22,803	$22,803
-	104 Ave. at 133 St.	1000089972	200	AC	1963	2013	91	375	$1,591	$145,240	$145,240
-	104 Ave. at 133 St.	1000089973	150	AC	1963	2013	150	250	$1,313	$197,446	$197,446
-	105A Ave. east of King George Blvd	1000092921	200	AC	1963	2013	51	375	$1,591	$ 80,878	$80,878
-	105A Ave. west of City Parkway	1000089961	250	AC	1963	2013	98	450	$1,763	$171,868	$171,868
-	111A Ave. at Bolivar Rd.	1000089773	200	VCP	1963	2013	29	250	$1,313	$ 38,378	$38,378
-	112 Ave. at 132 St. Diversion	1000090487	300	AC	1963	2013	154	525	$1,938	$297,744	$297,744
-	112 Ave. at 132 St. Diversion	1000090506	300	AC	1963	2013	46	525	$1,938	$89,128	$89,128
-	112 Ave. at 135 St.	1000090508	200	VCP	1963	2013	115	375	$1,591	$ 182,208	$182,208
-	112 Ave. at 135 St.	1000090509	200	VCP	1963	2013	118	300	$1,413	$166,028	$166,028
-	132 St. at 114 Ave.	1000091431	450	CP	1973	2013	9	900	$2,850	$ 26,355	$26,355
-	132 St. south of 96 Ave.	1000080224	200	AC	1973	2013	53	300	$1,413	$ 74,453	$74,453
-	132 St. south of 96 Ave.	1000080225	200	AC	1973	2013	118	300	$1,413	$167,325	$167,325
-	132 St. south of 96 Ave.	1000080226	200	AC	1973	2013	124	300	$1,413	$174,458	$174,458
-	132 St. south of 96 Ave.	1000080227	200	AC	1973	2013	119	300	$1,413	$168,483	$168,483
-	132 St. south of 96 Ave.	1000080228	200	AC	1973	2013	124	300	$1,413	$174,868	$174,868
-	136 St. at 112 Ave.	1000089766	200	VCP	1963	2013	92	375	$1,591	$147,033	$147,033
-	139 St. at 104 Ave.	1000092797	200	VCP	1963	2013	73	375	$1,591	$116,358	$116,358
-	139 St. at 104 Ave.	1000092798	200	VCP	1963	2013	128	375	$1,591	$ 203,642	$203,642
-	139 St. north of 104 Ave.	1000092794	200	VCP	1963	2013	123	375	$1,591	$195,447	$195,447
-	Brentwood Crescent at Bentley Road	1000092938	200	VCP	1963	2013	102	375	$1,591	$162,778	$162,778
-	City Parkway north of 105 Ave.	1000089727	150	AC	1963	2013	87	300	$1,413	$122,520	$122,520

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	Grosvenor Road at Franklin Road	1000092957	200	VCP	1963	2013	111	375	$1,591	$176,455	$176,455
-	Queen Elizabeth SS	1000080419	200	AC	1973	2013	73	250	$1,313	$95,567	$95,567
		Total					2,562			$ 3,915,884	$ 3,915,884

^Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

A7. 2014 - 2023 Gravity Sewer Capacity Upgrades

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	108 Ave. at 132A St.	1000090181	250	AC	1963	2017	16	450	$ 1,763	$ 27,426	$ 26,628
-	132 St. north of 96 Ave.	1000082350	200	AC	1973	2017	108	300	$ 1,413	$ 152,065	$ 147,636
-	132 St. north of 96 Ave.	1000082351	200	AC	1973	2017	123	300	$ 1,413	$ 174,036	$ 168,967
-	139 St. at 108 Ave.	1000092793	200	VCP	1963	2017	130	375	$ 1,591	$ 206,538	$ 200,522
-	139 St. south of 96 Ave.	1000079824	200	AC	1974	2017	101	375	$ 1,591	$ 161,235	$ 156,539
-	Bentley Rd. at King George Blvd.	1000089791	150	VCP	1963	2017	153	450	$ 1,763	$ 270,368	$ 262,493
-	Queen Elizabeth SS	1000080207	200	AC	1973	2017	115	250	$ 1,313	$ 151,399	$ 146,990
-	100 Ave. at 143 St.	1000088420	200	AC	1972	2018	95	300	$ 1,413	$ 133,841	$ 126,158
-	100 Ave. at 143 St.	1000088421	200	AC	1972	2018	116	300	$ 1,413	$ 164,155	$ 154,732
-	108 Ave. at 132A St.	1000089597	250	AC	1963	2018	9	375	$ 1,591	$ 13,573	$ 12,794
-	Bentley Rd. at King George Blvd.	1000089789	300	PVC	2008	2018	43	525	$ 1,938	$ 83,700	$ 78,895
-	Grosvenor Road at Franklin Road	1000092452	200	VCP	1963	2018	89	375	$ 1,591	$ 141,929	$ 133,781
-	100 Ave. at 140 St.	1000088377	200	VCP	1972	2019	51	300	$ 1,413	$ 72,714	$ 66,544
-	112 Ave. at 132 St. Diversion	1000090507	300	VCP	1963	2019	114	450	$ 1,763	$ 201,792	$ 184,669
-	112 Ave. at 135 St.	1000091574	200	VCP	1963	2019	109	300	$ 1,413	$ 153,612	$ 140,577
-	132 St. north of King George Blvd.	1000091669	450	CP	1963	2019	92	675	$ 2,338	$ 215,078	$ 196,827
-	139 St. south of 96 Ave.	1000079819	200	AC	1973	2019	85	300	$ 1,413	$ 120,472	$ 110,249
-	Lane east of King George Blvd., south of 105A Ave.	1000092936	200	VCP	1963	2019	103	375	$ 1,591	$ 163,318	$ 149,459
-	132 St. north of King George Blvd.	1000091668	450	CP	1963	2019	62	675	$ 2,338	$ 143,957	$ 127,904
-	134A St. at 105A Ave.	1000089953	150	AC	1963	2019	97	250	$ 1,313	$ 126,791	$ 112,652
-	94A Ave. at 139 St.	1000079805	200	AC	1972	2019	61	300	$ 1,413	$ 86,078	$ 76,480
-	94A Ave. at 139 St.	1000079814	250	AC	1970	2019	12	375	$ 1,591	$ 19,491	$ 17,318
-	132 St. at Old Yale Road	1000082409	200	VCP	1963	2020	114	300	$ 1,413	$ 161,423	$ 139,245
-	141 St. at 101 Ave.	1000088410	200	VCP	1972	2020	86	300	$ 1,413	$ 121,066	$ 104,432
-	141 St. at 101 Ave.	1000088411	200	AC	1972	2020	69	300	$ 1,413	$ 97,110	$ 83,768
-	132 St. at Old Yale Road	1000082411	200	VCP	1963	2020	125	300	$ 1,413	$ 176,750	$ 148,025
-	100 Ave. at Whalley Blvd.	1000088321	250	PVC	1987	2020	6	300	$ 1,413	$ 8,302	$ 6,750
-	132 St. north of 96 Ave.	1000082353	200	AC	1973	2021	14	250	$ 1,313	$ 18,001	$ 14,210
-	132 St. north of King George Blvd.	1000859861	450	CP	1963	2021	16	600	$ 2,113	$ 34,206	$ 27,003
-	132A St. at 105A Ave.	1000089939	200	AC	1963	2021	134	300	$ 1,413	$ 189,787	$ 149,820
-	140 St. at 108 Ave.	1000092691	150	VCP	1963	2021	15	250	$ 1,313	$ 19,793	$ 15,624

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	111A Ave. and Brentwood Crescent	1000092942	200	VCP	1963	2022	108	300	$ 1,413	$ 152,256	$ 116,692
-	140 St. south of 100 Ave.	1000088464	200	AC	1974	2022	98	300	$ 1,413	$ 138,995	$ 106,528
-	141 St. at 102 Ave.	1000088408	200	VCP	1972	2022	99	250	$ 1,313	$ 129,911	$ 99,566
-	King George Blvd. at 108 Ave.	2	375	PVC	2013	2022	52	600	$ 2,113	$ 109,956	$ 84,272
-	Queen Elizabeth SS	1000080208	200	AC	1973	2022	71	250	$ 1,313	$ 93,635	$ 71,764
-	100 Ave. east of 143 St.	1000088419	200	AC	1972	2023	79	250	$ 1,313	$ 104,270	$ 77,587
-	132 St. north of 96 Ave.	1000082397	200	AC	1973	2023	32	250	$ 1,313	$ 42,579	$ 31,683
-	132 St. north of King George Blvd.	1000091667	450	CP	1963	2023	90	600	$ 2,113	$ 189,918	$ 141,317
-	132 St. north of King George Blvd.	1000091670	450	CP	1963	2023	44	600	$ 2,113	$ 93,142	$ 69,307
-	135A St. at 107A Ave.	1000089923	200	AC	1963	2023	73	300	$ 1,413	$ 103,145	$ 76,749
-	141 St. south of 102 Ave.	1000088409	200	VCP	1972	2023	63	250	$ 1,313	$ 82,215	$ 61,176
-	Grosvenor Rd. at 108 Ave.	1000092961	150	AC	1963	2023	7	300	$ 1,413	$ 10,075	$ 7,497
		Total					3,281			$ 5,060,106	$ 4,431,827

^Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

A8. 2024 – 2033 Gravity Sewer Capacity Upgrades

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	102 Ave. at 139 St.	1000088544	200	AC	1972	2024	69	300	$ 1,413	$ 97,980	$ 70,783
-	112B Ave. at 132 St.	1000090503	300	AC	1963	2024	30	450	$ 1,763	$ 53,528	$ 38,670
-	112B Ave. at 132 St.	1000090504	300	AC	1963	2024	124	450	$ 1,763	$ 218,379	$ 157,761
-	130 St. south of 108 Ave.	1000089879	200	VCP	1963	2024	116	250	$ 1,313	$ 151,712	$ 109,600
-	132 St. north of 96 Ave.	1000082352	200	AC	1973	2024	91	250	$ 1,313	$ 119,294	$ 86,181
-	135A St. at 107A Ave.	1000089924	200	AC	1963	2024	118	300	$ 1,413	$ 167,342	$ 120,891
-	94A Ave. at 139 St.	1000079815	250	AC	1970	2024	90	375	$ 1,591	$ 143,967	$ 104,005
-	King George Blvd. north of 108 Ave.	4	375	PVC	2013	2024	27	525	$ 1,938	$ 51,634	$ 37,302
-	130 St. south of 108 Ave.	1000089908	200	VCP	1963	2025	101	250	$ 1,313	$ 133,045	$ 93,315
-	132 St. south of Old Yale Road	1000082141	200	AC	1963	2025	31	300	$ 1,413	$ 43,364	$ 30,415
-	Bolivar Crescent at King George Blvd.	1000089787	200	VCP	1963	2025	94	375	$ 1,591	$ 149,936	$ 105,162
-	Grosvenor Road at Hilton Road	1000092958	200	VCP	1963	2025	109	300	$ 1,413	$ 153,500	$ 107,662
-	102 Ave. at 139 St.	1000088543	200	AC	1972	2026	51	300	$ 1,413	$ 71,747	$ 48,856
-	104 Ave. at Whalley Blvd.	1000093062	300	AC	1963	2026	13	450	$ 1,763	$ 23,110	$ 15,737
-	111A Ave. at 135A St.	1000089778	150	VCP	1963	2026	54	250	$ 1,313	$ 70,391	$ 47,933
-	140 St. north of 106 Ave.	1000092740	200	VCP	1963	2026	95	300	$ 1,413	$ 134,795	$ 91,789
-	140 St. north of 106 Ave.	1000092741	200	VCP	1963	2026	95	300	$ 1,413	$ 134,371	$ 91,500
-	140 St. north of 106 Ave.	1000092742	200	VCP	1963	2026	95	300	$ 1,413	$ 134,357	$ 91,491
-	96 Ave. east of King George Blvd.	1000088188	250	AC	1966	2026	152	375	$ 1,591	$ 242,360	$ 165,035
-	98B Ave, west of 134 St.	1000082363	200	PVC	1977	2026	87	300	$ 1,413	$ 122,633	$ 83,507
-	King George Blvd. at 94A Ave.	1000079680	675	PVC	1999	2026	15	900	$ 2,850	$ 42,543	$ 28,970
-	104 Ave. at 133 St.	1000089971	200	AC	1963	2027	69	250	$ 1,313	$ 90,248	$ 59,665
-	104 Ave. at Whalley Blvd.	1000093063	300	AC	1963	2027	74	450	$ 1,763	$ 130,393	$ 86,205
-	98A Ave. west of 133A St.	1000082369	200	PVC	1977	2027	42	300	$ 1,413	$ 59,468	$ 39,315
-	Bolivar Crescent at King George Blvd.	1000089788	200	VCP	1963	2027	105	375	$ 1,591	$ 167,366	$ 110,649
-	King George Blvd. at 96 Ave.	1000080856	450	PVC	1999	2027	14	600	$ 2,113	$ 29,998	$ 19,832
-	King George Blvd. north of 108 Ave.	3	300	PVC	2013	2027	19	525	$ 1,938	$ 37,394	$ 24,722
-	Lane east of King George Blvd., south of 105A Ave.	1000092935	200	VCP	1963	2027	94	300	$ 1,413	$ 132,367	$ 87,510
-	Whalley Blvd. south of 100 Ave.	1000088346	600	PVC	1992	2027	113	750	$ 2,513	$ 284,383	$ 188,011
-	109 Ave. at 139A St.	1000092447	150	VCP	1963	2028	56	250	$ 1,313	$ 73,579	$ 47,227

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	111A Ave. at 136 St.	1000092943	200	VCP	1963	2028	116	300	$ 1,413	$ 163,443	$ 104,908
-	132 St. north of Old Yale Road	1000082410	200	AC	1963	2028	4	300	$ 1,413	$ 5,594	$ 3,590
-	104 Ave. at Whalley Blvd.	1000093064	300	AC	1963	2029	81	450	$ 1,763	$ 142,768	$ 88,968
-	106 Ave. at 135A St.	1000089726	200	AC	1963	2029	101	300	$ 1,413	$ 142,811	$ 88,995
-	108 Ave. at 130 St.	1000090176	200	VCP	1963	2029	114	250	$ 1,313	$ 149,087	$ 92,906
-	King George Blvd. at 108 Ave.	1	375	PVC	2013	2029	11	600	$ 2,113	$ 22,329	$ 13,915
-	102 Ave east of 139 St.	1000088343	200	VCP	1972	2030	45	300	$ 1,413	$ 62,890	$ 38,049
-	132 St. at King George Blvd.	1000091568	600	PVC	1999	2030	4	750	$ 2,513	$ 9,140	$ 5,530
-	133 St. at 102A Ave.	1000082558	150	AC	1967	2030	107	250	$ 1,313	$ 139,966	$ 84,682
-	139A St. at 109 Ave.	1000093033	150	VCP	1963	2030	130	250	$ 1,313	$ 170,352	$ 103,066
-	96 Ave. west of 134 St.	1000082383	200	AC	1973	2030	95	300	$ 1,413	$ 134,161	$ 81,170
-	108 Ave. at 132A St.	1000090180	250	VCP	1963	2031	85	300	$ 1,413	$ 120,395	$ 70,719
-	111A Ave. at 136 St.	1000092944	200	VCP	1963	2031	128	300	$ 1,413	$ 180,648	$ 106,112
-	94A Ave. at 139 St.	1000079670	250	AC	1970	2031	72	300	$ 1,413	$ 101,223	$ 59,458
-	Nordsun Rd. at 135A St.	1000089781	150	VCP	1963	2031	103	200	$ 1,200	$ 123,936	$ 72,799
-	132 St. north of 96 Ave.	1000082398	200	AC	1973	2032	30	250	$ 1,313	$ 39,073	$ 22,283
-	Berg Rd. at Cowan Rd.	1000092956	150	VCP	1963	2032	111	250	$ 1,313	$ 145,225	$ 82,820
-	108 Ave. east of 138 St.	1000092789	150	VCP	1963	2033	99	250	$ 1,313	$ 129,964	$ 71,958
-	132 St. north of 109 Ave.	1000090149	200	AC	1963	2033	106	300	$ 1,413	$ 149,334	$ 82,682
-	139 St. north of 96 Ave.	1000088494	200	PVC	1980	2033	102	300	$ 1,413	$ 143,489	$ 79,446
-	Selkirk Dr. at Cowan Rd.	1000092448	150	VCP	1963	2033	119	250	$ 1,313	$ 156,652	$ 86,734
		Total					4,004			$ 5,897,663	$ 3,830,490

^Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

A9. **2034 – 2043 Gravity Sewer Capacity Upgrades**

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	139 St. north of 96 Ave.	1000088495	200	PVC	1980	2034	49	300	$ 1,413	$ 68,862	$ 37,017
-	Brentwood Crescent north of Grosvenor Rd.	1000092937	200	VCP	1963	2034	103	250	$ 1,313	$ 135,044	$ 72,593
-	Lane north of 98B Ave at 134 St.	1000082359	200	AC	1977	2034	61	250	$ 1,313	$ 79,961	$ 42,983
-	102 Ave east of 139 St.	1000088280	200	AC	1972	2035	38	300	$ 1,413	$ 54,104	$ 28,236
-	102 Ave east of 139 St.	1000088281	200	AC	1972	2035	14	300	$ 1,413	$ 19,650	$ 10,255
-	105A Ave. east of University Dr.	1000089728	250	AC	1963	2035	94	375	$ 1,591	$ 149,095	$ 77,812
-	133 St. north of Old Yale Road	1000082557	150	AC	1967	2035	93	250	$ 1,313	$ 121,957	$ 63,648
-	139 St. north of 96 Ave.	1000088358	200	PVC	1991	2035	26	300	$ 1,413	$ 36,214	$ 18,900
-	Lane W of KG Blvd S of 104 Ave	1000079424	200	AC	1973	2035	87	300	$ 1,413	$ 122,824	$ 64,101
-	134 St. north of 98B Ave.	1000082370	200	AC	1974	2036	114	250	$ 1,313	$ 149,159	$ 75,577
-	139 St. north of 96 Ave.	1000088359	200	PVC	1991	2036	32	300	$ 1,413	$ 44,623	$ 22,610
-	139 St. north of 96 Ave.	1000088499	200	PVC	1980	2036	67	300	$ 1,413	$ 95,211	$ 48,242
-	Hilton Rd. at Grosvenor Rd.	1000092967	200	VCP	1963	2036	103	300	$ 1,413	$ 145,673	$ 73,811
-	King George Blvd. north of 108 Ave.	5	450	PVC	2013	2036	104	600	$ 2,113	$ 219,066	$ 110,999
-	139 St. north of 104 Ave.	1000092795	200	VCP	1963	2037	130	300	$ 1,413	$ 183,329	$ 90,186
-	139 St. north of 104 Ave.	1000092796	200	VCP	1963	2037	130	300	$ 1,413	$ 183,330	$ 90,186
-	139A St, at Brentwood Crescent	1000093034	150	VCP	1963	2037	111	250	$ 1,313	$ 145,165	$ 71,411
-	139A St. north of 102 Ave.	1000088385	200	VCP	1972	2037	112	300	$ 1,413	$ 158,804	$ 78,121
-	Grosvenor Road at Selkirk Dr.	1000092451	200	VCP	1963	2037	102	300	$ 1,413	$ 144,113	$ 70,894
-	King George Blvd. north of 108 Ave.	6	450	PVC	2013	2037	13	600	$ 2,113	$ 27,251	$ 13,406
-	Lane east of Whalley Blvd., north of 105A Ave.	1000092927	200	VCP	1963	2037	96	300	$ 1,413	$ 136,000	$ 66,903
-	Whalley Blvd. at Grosvenor Rd.	1000092959	150	VCP	1963	2037	134	250	$ 1,313	$ 175,823	$ 86,493
-	105A Ave. east of City Parkway	1000089960	200	AC	1963	2038	93	300	$ 1,413	$ 131,198	$ 62,661
-	138A St. north of 104 Ave.	1000092804	200	VCP	1963	2038	108	300	$ 1,413	$ 152,355	$ 72,766
-	Brentwood Crescent at Grosvenor Rd.	1000093042	200	VCP	1963	2039	138	250	$ 1,313	$ 181,178	$ 84,011
-	Lane north of 98B Ave at 134 St.	1000082360	200	AC	1977	2039	37	250	$ 1,313	$ 49,024	$ 22,732
-	105 Ave. east of University Dr.	1000089731	525	CP	1963	2040	114	675	$ 2,338	$ 267,448	$ 120,402
-	98A Ave., west of King George Blvd.	1000082376	200	AC	1973	2040	73	250	$ 1,313	$ 95,973	$ 43,206
-	King George Blvd. north of 108 Ave.	7	450	PVC	2013	2040	76	600	$ 2,113	$ 159,916	$ 71,993
-	King George Blvd. south of 107A Ave.	1000089986	200	AC	1963	2040	109	250	$ 1,313	$ 142,752	$ 64,265

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	King George Blvd., south of 98 Ave.	1000080848	200	AC	1973	2040	48	250	$ 1,313	$ 63,175	$ 28,441
-	Brentwood Crescent at 139A St.	1000093036	200	VCP	1963	2041	107	300	$ 1,413	$ 151,467	$ 66,203
-	Hilton Road and Bolivar Crescent	1000089785	150	VCP	1963	2041	52	250	$ 1,313	$ 68,455	$ 29,920
-	138A St., north of 104 Ave.	1000093056	200	VCP	1963	2042	108	250	$ 1,313	$ 141,556	$ 60,069
-	139 St. north of 96 Ave.	1000088496	200	PVC	1980	2042	45	250	$ 1,313	$ 58,552	$ 24,846
-	Antrim Road east of Brentwood Crescent	1000093040	200	VCP	1963	2042	77	300	$ 1,413	$ 108,418	$ 46,007
		Total					2,996			$ 4,366,724	$2,111,907

^Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

A10. 2044 – Build Out Gravity Sewer Capacity Upgrades

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	104 Ave. east of 138 St.	1000093065	300	AC	1963	2044	89	375	$ 1,591	$ 141,426	$ 56,568
-	96 Ave. between 134 St. and King George Blvd.	1000081853	200	AC	1973	2044	108	300	$ 1,413	$ 152,114	$ 60,844
-	City Parkway south of 108 Ave.	1000089930	150	AC	1963	2044	123	200	$ 1,200	$ 148,080	$ 59,230
-	Hilton Rd. at Grosvenor Rd.	1000093023	200	VCP	1963	2044	105	250	$ 1,313	$ 137,756	$ 55,100
-	105A Ave. east of City Parkway	1000089958	200	AC	1963	2045	7	300	$ 1,413	$ 9,309	$ 3,615
-	140 St. south of 100 Ave.	1000088180	300	PVC	2006	2045	9	375	$ 1,591	$ 14,291	$ 5,550
-	102 Ave. at 138A St.	1000088372	200	AC	1972	2046	42	250	$ 1,313	$ 55,694	$ 20,998
-	102 Ave. east of 139 St.	1000088542	200	AC	1972	2046	84	250	$ 1,313	$ 109,787	$ 41,393
-	111 Ave. east of 136 St.	1000092945	150	VCP	1963	2046	117	250	$ 1,313	$ 153,553	$ 57,893
-	104 Ave. at King George Blvd	1000092433	350	AC	1963	2047	20	450	$ 1,763	$ 36,099	$ 13,214
-	104 Ave. at King George Blvd	1000092434	350	AC	1963	2047	19	450	$ 1,763	$ 33,501	$ 12,263
-	133A St. south of 104 Ave.	1000082554	200	AC	1962	2047	76	300	$ 1,413	$ 107,173	$ 39,230
-	133A St. south of 104 Ave.	1000082555	200	AC	1962	2047	75	300	$ 1,413	$ 105,436	$ 38,594
-	138A St., north of 104 Ave.	1000092803	200	VCP	1963	2047	108	250	$ 1,313	$ 141,556	$ 51,816
-	Grosvenor Rd. at 108 Ave.	1000092960	150	VCP	1963	2047	101	250	$ 1,313	$ 132,286	$ 48,423
-	100 Ave. and Whalley Blvd	1000088371	200	PVC	1992	2048	17	300	$ 1,413	$ 23,732	$ 8,434
-	East of 135A St., south of 108 Ave.	1000089921	150	AC	1963	2049	94	200	$ 1,200	$ 112,437	$ 38,794
-	Grosvenor Rd east of Brentwood Crescent	1000093024	200	VCP	1963	2049	107	250	$ 1,313	$ 139,964	$ 48,292
-	103 Ave. at City Parkway	1000079426	150	AC	1963	2050	73	200	$ 1,200	$ 87,937	$ 29,457
-	108 Ave. east of Whalley Blvd	1000092791	150	VCP	1963	2050	104	250	$ 1,313	$ 135,962	$ 45,545
-	136 St. north of 111 Ave.	1000089765	200	VCP	1963	2050	111	250	$ 1,313	$ 145,135	$ 48,618
-	138 St. north of 104 Ave.	1000092915	200	VCP	1963	2050	106	300	$ 1,413	$ 149,757	$ 50,166
-	140 St. south of 100 Ave.	1000088465	200	AC	1974	2050	117	250	$ 1,313	$ 153,554	$ 51,438
-	Lane west of King George Blvd., north of 104 Ave.	1000089730	525	CP	1963	2050	165	675	$ 2,338	$ 386,101	$ 129,337
-	100A Ave. east of 132 St.	1000082421	200	AC	1974	2051	96	300	$ 1,413	$ 135,944	$ 44,213
-	139 St., north of 96 Ave.	1000088493	200	PVC	1980	2052	34	250	$ 1,313	$ 44,784	$ 14,141
-	96 Ave. between 134 St. and King George Blvd.	1000080912	200	PVC	2005	2052	3	250	$ 1,313	$ 3,504	$ 1,106
-	132A St. south of 108 Ave.	1000089941	200	AC	1963	2053	119	250	$ 1,313	$ 155,954	$ 47,809
-	Laurel Dr. west of 140 St.	1000088486	200	AC	1974	2053	37	250	$ 1,313	$ 48,483	$ 14,863
-	138 St. north of 104 Ave.	1000092914	200	VCP	1963	2054	106	300	$ 1,413	$ 149,333	$ 44,446

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	Antrim Road east of Brentwood Crescent	1000093041	200	VCP	1963	2055	77	250	$ 1,313	$ 101,138	$ 29,225
-	Berg Rd. at Grosvenor Rd.	1000092442	150	VCP	1963	2055	111	200	$ 1,200	$ 133,133	$ 38,470
-	King George Blvd. south of 107A Ave.	1000089987	200	AC	1963	2055	116	250	$ 1,313	$ 152,753	$ 44,139
-	University Dr. at 105 Ave.	1000089692	525	CP	1993	2055	16	675	$ 2,338	$ 37,260	$ 10,767
-	100 Ave. at King George Blvd	1000088370	200	PVC	1992	2056	96	300	$ 1,413	$ 134,982	$ 37,868
-	Brentwood Crescent at Bentley Road	1000092939	200	VCP	1963	2056	103	250	$ 1,313	$ 135,051	$ 37,888
-	100A Ave. east of 132 St.	1000082420	200	AC	1974	2057	25	250	$ 1,313	$ 33,167	$ 9,034
-	139 St. north of 96 Ave.	1000088360	200	PVC	1991	2057	4	250	$ 1,313	$ 4,594	$ 1,251
-	94A Ave at King George Blvd	1000079656	675	PVC	1999	2057	5	750	$ 2,513	$ 13,250	$ 3,609
-	Harper Rd. between Bentley Rd. and Grosvenor Rd.	1000092965	150	VCP	1963	2057	86	200	$ 1,200	$ 103,100	$ 28,082
-	104 Ave. at King George Blvd	1000093059	350	AC	1963	2058	13	450	$ 1,763	$ 22,752	$ 6,016
-	105 Ave. west of University Dr.	1000089977	200	AC	1963	2058	43	250	$ 1,313	$ 55,808	$ 14,758
-	138 St. north of 105 Ave.	1000092912	200	VCP	1963	2058	94	250	$ 1,313	$ 122,761	$ 32,463
-	East of 132 St., north of 112 Ave.	1000090505	300	AC	1963	2058	152	375	$ 1,591	$ 242,056	$ 64,009
-	100 Ave. at King George Blvd	1000082167	200	PVC	1992	2059	84	300	$ 1,413	$ 118,003	$ 30,296
-	102A Ave. at 133A St.	1000082425	150	CP	1968	2059	79	200	$ 1,200	$ 95,064	$ 24,406
-	105 Ave. east of City Parkway	1000089963	525	CP	1963	2059	111	600	$ 2,113	$ 235,322	$ 60,416
-	111 Ave. east of 136 St.	1000092946	150	VCP	1963	2059	109	200	$ 1,200	$ 130,899	$ 33,606
-	133 St. south of 104 Ave.	1000082559	200	AC	1962	2059	67	250	$ 1,313	$ 88,591	$ 22,745
-	Lane north of 102 Ave. at University Dr.	1000082437	150	AC	1963	2059	67	200	$ 1,200	$ 80,797	$ 20,743
-	111 Ave. east of 136 St.	1000092947	150	VCP	1963	2060	109	200	$ 1,200	$ 130,887	$ 32,625
-	132 St. south of Old Yale Road	1000082405	200	AC	1963	2060	80	250	$ 1,313	$ 105,565	$ 26,313
-	139 St. south of 102 Ave.	1000088383	200	AC	1972	2060	91	300	$ 1,413	$ 129,116	$ 32,183
-	Selkirk Dr. at Grosvenor Rd	1000092449	150	VCP	1963	2060	119	200	$ 1,200	$ 142,491	$ 35,517
-	100 Ave. east of 141 St.	1000088278	300	PVC	2005	2062	109	375	$ 1,591	$ 173,510	$ 40,766
-	King George Blvd at 98 Ave.	1000081852	200	AC	1973	2062	108	250	$ 1,313	$ 141,557	$ 33,259
-	Lane east of 137A St., north of 105A Ave.	1000092430	200	VCP	1963	2062	96	250	$ 1,313	$ 125,964	$ 29,595
-	Lane east of 137A St., north of 105A Ave.	1000092928	200	VCP	1963	2062	96	250	$ 1,313	$ 125,964	$ 29,595
-	132A St. south of 108 Ave.	1000089940	200	AC	1963	2063	119	250	$ 1,313	$ 155,954	$ 35,574
-	100A Ave. east of 132 St.	1000079431	200	AC	1974	2064	18	250	$ 1,313	$ 23,038	$ 5,102
-	132 St. south of Old Yale Road	1000082408	200	AC	1963	2064	102	250	$ 1,313	$ 134,349	$ 29,753

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	133A St. at 98B Ave.	1000082362	200	PVC	1977	2064	47	250	$ 1,313	$ 61,887	$ 13,706
-	Fraser Hwy west of Whalley Blvd	1000088288	600	PVC	1992	2064	42	675	$ 2,338	$ 98,655	$ 21,849
-	Haddon Rd and Hilton Rd	1000089786	150	VCP	1963	2064	51	200	$ 1,200	$ 60,687	$ 13,440
-	Lane east of Whalley Blvd, south of 107A Ave.	1000092926	200	VCP	1963	2064	96	250	$ 1,313	$ 126,358	$ 27,984
-	105 Ave. west of City Parkway	1000089964	525	CP	1963	2065	86	600	$ 2,113	$ 181,683	$ 39,064
-	105A Ave. east of King George Blvd	1000092920	200	VCP	1963	2066	100	250	$ 1,313	$ 131,748	$ 27,502
-	City Parkway south of 105A Ave.	1000089954	150	AC	1963	2066	97	200	$ 1,200	$ 115,804	$ 24,174
-	132 St. south of Old Yale Road	1000082142	200	AC	1997	2067	12	250	$ 1,313	$ 15,658	$ 3,173
-	135A St. south of 108 Ave.	1000089920	200	AC	1963	2067	148	250	$ 1,313	$ 194,022	$ 39,322
-	135A St. south of 112 Ave.	1000089770	150	VCP	1963	2067	141	200	$ 1,200	$ 169,646	$ 34,382
-	Harper Rd. between Bentley Rd. and Grosvenor Rd.	1000092966	150	VCP	1963	2067	91	200	$ 1,200	$ 109,690	$ 22,231
-	Laurel Dr. west of 140 St.	1000088362	200	AC	1974	2067	33	250	$ 1,313	$ 43,485	$ 8,813
-	140 St. south of 108 Ave.	1000092739	200	VCP	1963	2071	113	250	$ 1,313	$ 148,785	$ 26,792
-	Fraser Hwy east of 138 St.	1000088476	200	AC	1968	2071	105	250	$ 1,313	$ 137,674	$ 24,791
-	133 St. south of 104 Ave.	1000082560	200	AC	1962	2072	112	250	$ 1,313	$ 147,634	$ 25,810
-	138A St. north of 104 Ave.	1000092423	200	PVC	1994	2072	15	250	$ 1,313	$ 19,150	$ 3,348
-	139 St. south of 102 Ave.	1000088382	200	AC	1972	2072	95	250	$ 1,313	$ 124,766	$ 21,812
-	140 St. south of 100 Ave.	1000088461	200	PVC	1980	2072	42	250	$ 1,313	$ 55,107	$ 9,634
-	105 Ave. east of City Parkway	1000089885	525	CP	1963	2073	24	600	$ 2,113	$ 50,428	$ 8,559
-	140 St. south of 100 Ave.	1000088463	200	AC	1974	2073	29	250	$ 1,313	$ 37,482	$ 6,362
-	Hilton Rd. east of Haddon Rd.	1000849877	150	VCP	1963	2073	36	200	$ 1,200	$ 43,597	$ 7,400
-	105A Ave. east of City Parkway	1000089959	200	AC	1963	2074	56	250	$ 1,313	$ 73,581	$ 12,125
-	133A St. south of 104 Ave.	1000082556	200	AC	1962	2074	91	250	$ 1,313	$ 119,970	$ 19,770
-	138A St. north of 104 Ave.	1000092800	200	PVC	1982	2074	72	250	$ 1,313	$ 94,593	$ 15,588
-	98A Ave., west of King George Blvd.	1000082377	200	AC	1973	2074	55	250	$ 1,313	$ 72,387	$ 11,929
-	West of Whalley Blvd north of 105A Ave.	1000092922	150	VCP	1963	2074	81	200	$ 1,200	$ 97,611	$ 16,085
-	102 Ave. at University Dr.	1000080870	350	PVC	2001	2075	49	375	$ 1,591	$ 78,060	$ 12,489
-	140 St. north of 109 Ave.	1000093043	150	VCP	1963	2075	70	200	$ 1,200	$ 84,464	$ 13,513
-	Franklin Rd. at Grosvenor Rd.	1000092444	150	VCP	1963	2075	94	200	$ 1,200	$ 112,242	$ 17,958
-	Lane south of 100 Ave. at 134 St.	1000082358	200	PVC	1977	2075	40	250	$ 1,313	$ 52,341	$ 8,374
-	105 Ave. west of University Dr.	1000089978	200	AC	1963	2076	29	250	$ 1,313	$ 38,181	$ 5,931
-	132 St. south of Old Yale Road	1000082407	200	AC	1963	2076	79	250	$ 1,313	$ 103,781	$ 16,120

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Estimated Capital Cost	Net Present Value (3%)
-	140 St. south of 100 Ave.	1000088462	200	AC	1974	2076	67	250	$ 1,313	$ 88,085	$ 13,682
-	111A Ave at Hilton Rd.	1000089774	200	VCP	1963	2077	76	250	$ 1,313	$ 99,870	$ 15,061
-	132 St. south of 108 Ave.	1000087078	200	VCP	1963	2077	115	250	$ 1,313	$ 151,452	$ 22,840
-	132A St. south of 108 Ave.	1000089942	200	AC	1963	2077	119	250	$ 1,313	$ 155,967	$ 23,521
-	135A St. south of 112 Ave.	1000089769	150	VCP	1963	2077	125	200	$ 1,200	$ 149,532	$ 22,550
-	Bentley Rd. at Hilton Rd.	1000092431	200	VCP	1963	2077	81	250	$ 1,313	$ 105,921	$ 15,974
-	108 Ave. at University Drive	1000089932	200	AC	1963	2078	37	250	$ 1,313	$ 48,855	$ 7,153
-	98B Ave. at 134 St.	1000082374	200	AC	1973	2078	73	250	$ 1,313	$ 95,974	$ 14,052
-	Lane east of Whalley Blvd, south of 107A Ave.	1000092925	200	VCP	1963	2078	96	250	$ 1,313	$ 126,371	$ 18,502
-	132 St. south of 110 Ave.	1000090150	200	AC	1963	2079	105	250	$ 1,313	$ 137,960	$ 19,611
-	140 St. south of 100 Ave.	1000088369	200	PVC	1997	2079	10	250	$ 1,313	$ 12,490	$ 1,775
-	Bentley Rd south of 110A Ave.	1000092954	200	VCP	1963	2080	94	250	$ 1,313	$ 123,548	$ 17,051
-	132 St. at King George Blvd.	1000091666	450	CP	1963	2081	32	525	$ 1,938	$ 61,982	$ 8,305
-	98B Ave. at 134 St.	1000082373	200	AC	1973	2081	108	250	$ 1,313	$ 141,965	$ 19,022
-	138A St. north of 104 Ave.	1000092802	200	VCP	1963	2082	117	200	$ 1,200	$ 140,028	$ 18,216
-	140 St. south of 100 Ave.	1000088178	300	PVC	2006	2082	5	375	$ 1,591	$ 8,343	$ 1,085
-	102 Ave. east of Whalley Blvd	1000088132	350	DIP	1996	2083	34	375	$ 1,591	$ 54,141	$ 6,838
		Total					8,402			$11,483,164	$ 2,866,733

^Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

A11. DCC Eligible Gravity Main Projects

Gravity Sewer Upgrades											
10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Percentage of Flow Growth from Inside City Centre	DCC Eligible Capital Cost Attributable to City Centre
-	100 Ave. at 140 St.	1000088338	200	PVC	1989	2013	22	300	$ 1,413	100%	$ 30,911
-	100 Ave. at 140 St.	1000088339	200	PVC	1989	2013	102	300	$ 1,413	100%	$ 144,312
-	100 Ave. at 140 St.	1000088340	200	PVC	1989	2013	119	300	$ 1,413	100%	$ 167,382
-	100 Ave. at 140 St.	1000088341	200	PVC	1989	2013	21	300	$ 1,413	100%	$ 29,265
-	100 Ave. at Whalley Blvd.	1000088319	250	AC	1966	2013	14	375	$ 1,591	100%	$ 22,803
-	104 Ave. at 133 St.	1000089972	200	AC	1963	2013	91	375	$ 1,591	100%	$ 145,240
-	104 Ave. at 133 St.	1000089973	150	AC	1963	2013	150	250	$ 1,313	100%	$ 197,446
-	105A Ave. east of King George Blvd	1000092921	200	AC	1963	2013	51	375	$ 1,591	100%	$ 80,878
-	105A Ave. west of City Parkway	1000089961	250	AC	1963	2013	98	450	$ 1,763	100%	$ 171,868
-	111A Ave. at Bolivar Rd.	1000089773	200	VCP	1963	2013	29	250	$ 1,313	100%	$ 38,378
-	112 Ave. at 132 St. Diversion	1000090487	300	AC	1963	2013	154	525	$ 1,938	100%	$ 297,744
-	112 Ave. at 132 St. Diversion	1000090506	300	AC	1963	2013	46	525	$ 1,938	100%	$ 89,128
-	112 Ave. at 135 St.	1000090508	200	VCP	1963	2013	115	375	$ 1,591	100%	$ 182,208
-	112 Ave. at 135 St.	1000090509	200	VCP	1963	2013	118	300	$ 1,413	100%	$ 166,028
-	132 St. at 114 Ave.	1000091431	450	CP	1973	2013	9	900	$ 2,850	100%	$ 26,355
-	132 St. south of 96 Ave.	1000080224	200	AC	1973	2013	53	300	$ 1,413	38%	$ 28,341
-	132 St. south of 96 Ave.	1000080225	200	AC	1973	2013	118	300	$ 1,413	38%	$ 63,693
-	132 St. south of 96 Ave.	1000080226	200	AC	1973	2013	124	300	$ 1,413	38%	$ 66,408
-	132 St. south of 96 Ave.	1000080227	200	AC	1973	2013	119	300	$ 1,413	38%	$ 63,697
-	132 St. south of 96 Ave.	1000080228	200	AC	1973	2013	124	300	$ 1,413	38%	$ 66,111
-	136 St. at 112 Ave.	1000089766	200	VCP	1963	2013	92	375	$ 1,591	100%	$ 147,033
-	139 St. at 104 Ave.	1000092797	200	VCP	1963	2013	73	375	$ 1,591	100%	$ 116,358
-	139 St. at 104 Ave.	1000092798	200	VCP	1963	2013	128	375	$ 1,591	100%	$ 203,642
-	139 St. north of 104 Ave.	1000092794	200	VCP	1963	2013	123	375	$ 1,591	100%	$ 195,447
-	Brentwood Crescent at Bentley Road	1000092938	200	VCP	1963	2013	102	375	$ 1,591	100%	$ 162,778
-	City Parkway north of 105 Ave.	1000089727	150	AC	1963	2013	87	300	$ 1,413	100%	$ 122,520
-	Grosvenor Road at Franklin Road	1000092957	200	VCP	1963	2013	111	375	$ 1,591	100%	$ 176,455
-	Queen Elizabeth SS	1000080419	200	AC	1973	2013	73	250	$ 1,313	100%	$ 95,567
2013 Gravity Sewer Sub-Total							2,464				$ 3,315,544
-	108 Ave. at 132A St.	1000090181	250	AC	1963	2017	16	450	$ 1,763	100%	$ 27,426

Gravity Sewer Upgrades											
10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Percentage of Flow Growth from Inside City Centre	DCC Eligible Capital Cost Attributable to City Centre
-	139 St. at 108 Ave.	1000092793	200	VCP	1963	2017	130	375	$ 1,591	100%	$ 206,538
-	139 St. south of 96 Ave.	1000079824	200	AC	1974	2017	101	375	$ 1,591	100%	$ 161,235
-	Bentley Rd. at King George Blvd.	1000089791	150	VCP	1963	2017	153	450	$ 1,763	100%	$ 270,368
-	Queen Elizabeth SS	1000080207	200	AC	1973	2017	115	250	$ 1,313	100%	$ 151,399
-	108 Ave. at 132A St.	1000089597	250	AC	1963	2018	9	375	$ 1,591	100%	$ 13,573
-	Bentley Rd. at King George Blvd.	1000089789	300	PVC	2008	2018	43	525	$ 1,938	100%	$ 83,700
-	Grosvenor Road at Franklin Road	1000092452	200	VCP	1963	2018	89	375	$ 1,591	100%	$ 141,929
-	112 Ave. at 132 St. Diversion	1000090507	300	VCP	1963	2019	114	450	$ 1,763	100%	$ 201,792
-	112 Ave. at 135 St.	1000091574	200	VCP	1963	2019	109	300	$ 1,413	100%	$ 153,612
-	132 St. north of King George Blvd.	1000091669	450	CP	1963	2019	92	675	$ 2,338	100%	$ 215,078
-	139 St. south of 96 Ave.	1000079819	200	AC	1973	2019	85	300	$ 1,413	100%	$ 120,472
-	132 St. north of King George Blvd.	1000091668	450	CP	1963	2020	62	675	$ 2,338	100%	$ 143,957
-	94A Ave. at 139 St.	1000079805	200	AC	1972	2020	61	300	$ 1,413	100%	$ 86,078
-	94A Ave. at 139 St.	1000079814	250	AC	1970	2020	12	375	$ 1,591	100%	$ 19,491
-	100 Ave. at Whalley Blvd.	1000088321	250	PVC	1987	2020	6	300	$ 1,413	100%	$ 8,302
-	132 St. north of 96 Ave.	1000082353	200	AC	1973	2021	14	250	$ 1,313	40%	$ 7,186
-	132 St. north of King George Blvd.	1000859861	450	CP	1963	2021	16	600	$ 2,113	100%	$ 34,206
-	132A St. at 105A Ave.	1000089939	200	AC	1963	2021	134	300	$ 1,413	100%	$ 189,787
-	111A Ave. and Brentwood Crescent	1000092942	200	VCP	1963	2022	108	300	$ 1,413	100%	$ 152,256
-	140 St. south of 100 Ave.	1000088464	200	AC	1974	2022	98	300	$ 1,413	100%	$ 138,995
-	Queen Elizabeth SS	1000080208	200	AC	1973	2022	71	250	$ 1,313	100%	$ 93,635
-	132 St. north of 96 Ave.	1000082397	200	AC	1973	2023	32	250	$ 1,313	40%	$ 16,998
-	132 St. north of King George Blvd.	1000091667	450	CP	1963	2023	90	600	$ 2,113	100%	$ 189,918
-	132 St. north of King George Blvd.	1000091670	450	CP	1963	2023	44	600	$ 2,113	100%	$ 93,142
-	135A St. at 107A Ave.	1000089923	200	AC	1963	2023	73	300	$ 1,413	100%	$ 103,145
2014 - 2023 Gravity Sewer Sub-Total							1,879				$ 3,273,416
-	102 Ave. at 139 St.	1000088544	200	AC	1972	2024	69	300	$ 1,413	100%	$ 97,980
-	112B Ave. at 132 St.	1000090503	300	AC	1963	2024	30	450	$ 1,763	100%	$ 53,528
-	112B Ave. at 132 St.	1000090504	300	AC	1963	2024	124	450	$ 1,763	100%	$ 218,379
-	135A St. at 107A Ave.	1000089924	200	AC	1963	2024	118	300	$ 1,413	100%	$ 167,342
-	94A Ave. at 139 St.	1000079815	250	AC	1970	2024	90	375	$ 1,591	100%	$ 143,967
-	King George Blvd. north of 108 Ave.	4	375	PVC	2013	2024	27	525	$ 1,938	100%	$ 51,634
-	Grosvenor Road at Hilton Road	1000092958	200	VCP	1963	2025	109	300	$ 1,413	100%	$ 153,500

Gravity Sewer Upgrades											
10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Percentage of Flow Growth from Inside City Centre	DCC Eligible Capital Cost Attributable to City Centre
-	102 Ave. at 139 St.	1000088543	200	AC	1972	2026	51	300	$ 1,413	100%	$ 71,747
-	104 Ave. at Whalley Blvd.	1000093062	300	AC	1963	2026	13	450	$ 1,763	100%	$ 23,110
-	96 Ave. east of King George Blvd.	1000088188	250	AC	1966	2026	152	375	$ 1,591	100%	$ 242,360
-	King George Blvd. at 94A Ave.	1000079680	675	PVC	1999	2026	15	900	$ 2,850	100%	$ 42,543
-	104 Ave. at 133 St.	1000089971	200	AC	1963	2027	69	250	$ 1,313	100%	$ 90,248
-	104 Ave. at Whalley Blvd.	1000093063	300	AC	1963	2027	74	450	$ 1,763	100%	$ 130,393
-	King George Blvd. at 96 Ave.	1000080856	450	PVC	1999	2027	14	600	$ 2,113	100%	$ 29,998
-	Whalley Blvd. south of 100 Ave.	1000088346	600	PVC	1992	2027	113	750	$ 2,513	100%	$ 284,383
-	111A Ave. at 136 St.	1000092943	200	VCP	1963	2028	116	300	$ 1,413	100%	$ 163,443
-	104 Ave. at Whalley Blvd.	1000093064	300	AC	1963	2029	81	450	$ 1,763	100%	$ 142,768
-	106 Ave. at 135A St.	1000089726	200	AC	1963	2029	101	300	$ 1,413	100%	$ 142,811
-	102 Ave east of 139 St.	1000088343	200	VCP	1972	2030	45	300	$ 1,413	100%	$ 62,890
-	132 St. at King George Blvd.	1000091568	600	PVC	1999	2030	4	750	$ 2,513	100%	$ 9,140
-	108 Ave. at 132A St.	1000090180	250	VCP	1963	2031	85	300	$ 1,413	100%	$ 120,395
-	111A Ave. at 136 St.	1000092944	200	VCP	1963	2031	128	300	$ 1,413	100%	$ 180,648
-	94A Ave. at 139 St.	1000079670	250	AC	1970	2031	72	300	$ 1,413	100%	$ 101,223
-	132 St. north of 96 Ave.	1000082398	200	AC	1973	2032	30	250	$ 1,313	40%	$ 15,598
-	139 St. north of 96 Ave.	1000088494	200	PVC	1980	2033	102	300	$ 1,413	100%	$ 143,489
2024 - 2033 Gravity Sewer Sub-Total							1,831				$ 3,158,309
-	139 St. north of 96 Ave.	1000088495	200	PVC	1980	2034	49	300	$ 1,413	100%	$ 68,862
-	Brentwood Crescent north of Grosvenor Rd.	1000092937	200	VCP	1963	2034	103	250	$ 1,313	100%	$ 135,044
-	Lane north of 98B Ave at 134 St.	1000082359	200	AC	1977	2034	61	250	$ 1,313	100%	$ 79,961
-	102 Ave east of 139 St.	1000088280	200	AC	1972	2035	38	300	$ 1,413	100%	$ 54,104
-	102 Ave east of 139 St.	1000088281	200	AC	1972	2035	14	300	$ 1,413	100%	$ 19,650
-	105A Ave. east of University Dr.	1000089728	250	AC	1963	2035	94	375	$ 1,591	100%	$ 149,095
-	139 St. north of 96 Ave.	1000088358	200	PVC	1991	2035	26	300	$ 1,413	100%	$ 36,214
-	134 St. north of 98B Ave.	1000082370	200	AC	1974	2036	114	250	$ 1,313	100%	$ 149,159
-	139 St. north of 96 Ave.	1000088359	200	PVC	1991	2036	32	300	$ 1,413	100%	$ 44,623
-	139 St. north of 96 Ave.	1000088499	200	PVC	1980	2036	67	300	$ 1,413	100%	$ 95,211
-	Hilton Rd. at Grosvenor Rd.	1000092967	200	VCP	1963	2036	103	300	$ 1,413	100%	$ 145,673
-	King George Blvd. north of 108 Ave.	5	450	PVC	2013	2036	104	600	$ 2,113	100%	$ 219,066
-	139 St. north of 104 Ave.	1000092795	200	VCP	1963	2037	130	300	$ 1,413	100%	$ 183,329
-	139 St. north of 104 Ave.	1000092796	200	VCP	1963	2037	130	300	$ 1,413	100%	$ 183,330

Gravity Sewer Upgrades											
10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Percentage of Flow Growth from Inside City Centre	DCC Eligible Capital Cost Attributable to City Centre
-	King George Blvd. north of 108 Ave.	6	450	PVC	2013	2037	13	600	$ 2,113	100%	$ 27,251
-	138A St. north of 104 Ave.	1000092804	200	VCP	1963	2038	108	300	$ 1,413	100%	$ 152,355
-	Brentwood Crescent at Grosvenor Rd.	1000093042	200	VCP	1963	2039	138	250	$ 1,313	100%	$ 181,178
-	Lane north of 98B Ave at 134 St.	1000082360	200	AC	1977	2039	37	250	$ 1,313	100%	$ 49,024
-	105 Ave. east of University Dr.	1000089731	525	CP	1963	2040	114	675	$ 2,338	100%	$ 267,448
-	98A Ave., west of King George Blvd.	1000082376	200	AC	1973	2040	73	250	$ 1,313	100%	$ 95,973
-	King George Blvd. north of 108 Ave.	7	450	PVC	2013	2040	76	600	$ 2,113	100%	$ 159,916
-	King George Blvd. south of 107A Ave.	1000089986	200	AC	1963	2040	109	250	$ 1,313	100%	$ 142,752
-	King George Blvd., south of 98 Ave.	1000080848	200	AC	1973	2040	48	250	$ 1,313	100%	$ 63,175
-	138A St., north of 104 Ave.	1000093056	200	VCP	1963	2042	108	250	$ 1,313	100%	$ 141,556
-	139 St. north of 96 Ave.	1000088496	200	PVC	1980	2042	45	250	$ 1,313	100%	$ 58,552
2034 - 2043 Gravity Sewer Sub-Total							1,932				$3,014,364
-	104 Ave. east of 138 St.	1000093065	300	AC	1963	2044	89	375	$ 1,591	100%	$ 141,426
-	Hilton Rd. at Grosvenor Rd.	1000093023	200	VCP	1963	2044	105	250	$ 1,313	100%	$ 137,756
-	140 St. south of 100 Ave.	1000088180	300	PVC	2006	2045	9	375	$ 1,591	100%	$ 14,291
-	102 Ave. at 138A St.	1000088372	200	AC	1972	2046	42	250	$ 1,313	100%	$ 55,694
-	102 Ave. east of 139 St.	1000088542	200	AC	1972	2046	84	250	$ 1,313	100%	$ 109,787
-	104 Ave. at King George Blvd	1000092433	350	AC	1963	2047	20	450	$ 1,763	100%	$ 36,099
-	104 Ave. at King George Blvd	1000092434	350	AC	1963	2047	19	450	$ 1,763	100%	$ 33,501
-	138A St., north of 104 Ave.	1000092803	200	VCP	1963	2047	108	250	$ 1,313	100%	$ 141,556
-	136 St. north of 111 Ave.	1000089765	200	VCP	1963	2050	111	250	$ 1,313	100%	$ 145,135
-	138 St. north of 104 Ave.	1000092915	200	VCP	1963	2050	106	300	$ 1,413	100%	$ 149,757
-	140 St. south of 100 Ave.	1000088465	200	AC	1974	2050	117	250	$ 1,313	100%	$ 153,554
-	Lane west of King George Blvd., north of 104 Ave.	1000089730	525	CP	1963	2050	165	675	$ 2,338	100%	$ 386,101
-	139 St., north of 96 Ave.	1000088493	200	PVC	1980	2052	34	250	$ 1,313	100%	$ 44,784
-	96 Ave. between 134 St. and King George Blvd.	1000080912	200	PVC	2005	2052	3	250	$ 1,313	100%	$ 3,504
-	132A St. south of 108 Ave.	1000089941	200	AC	1963	2053	119	250	$ 1,313	100%	$ 155,954
-	138 St. north of 104 Ave.	1000092914	200	VCP	1963	2054	106	300	$ 1,413	100%	$ 149,333
-	King George Blvd. south of 107A Ave.	1000089987	200	AC	1963	2055	116	250	$ 1,313	100%	$ 152,753
-	University Dr. at 105 Ave.	1000089692	525	CP	1993	2055	16	675	$ 2,338	100%	$ 37,260

Gravity Sewer Upgrades											
10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	Percentage of Flow Growth from Inside City Centre	DCC Eligible Capital Cost Attributable to City Centre
-	Brentwood Crescent at Bentley Road	1000092939	200	VCP	1963	2056	103	250	$ 1,313	100%	$ 135,051
-	139 St. north of 96 Ave.	1000088360	200	PVC	1991	2057	4	250	$ 1,313	100%	$ 4,594
-	94A Ave at King George Blvd	1000079656	675	PVC	1999	2057	5	750	$ 2,513	100%	$ 13,250
-	104 Ave. at King George Blvd	1000093059	350	AC	1963	2058	13	450	$ 1,763	100%	$ 22,752
-	138 St. north of 105 Ave.	1000092912	200	VCP	1963	2058	94	250	$ 1,313	100%	$ 122,761
-	East of 132 St., north of 112 Ave.	1000090505	300	AC	1963	2058	152	375	$ 1,591	100%	$ 242,056
-	105 Ave. east of City Parkway	1000089963	525	CP	1963	2059	111	600	$ 2,113	100%	$ 235,322
-	King George Blvd at 98 Ave.	1000081852	200	AC	1973	2062	108	250	$ 1,313	100%	$ 141,557
-	132A St. south of 108 Ave.	1000089940	200	AC	1963	2063	119	250	$ 1,313	100%	$ 155,954
-	Fraser Hwy west of Whalley Blvd	1000088288	600	PVC	1992	2064	42	675	$ 2,338	100%	$ 98,655
-	105 Ave. west of City Parkway	1000089964	525	CP	1963	2065	86	600	$ 2,113	100%	$ 181,683
-	105A Ave. east of King George Blvd	1000092920	200	VCP	1963	2066	100	250	$ 1,313	100%	$ 131,748
-	138A St. north of 104 Ave.	1000092423	200	PVC	1994	2072	15	250	$ 1,313	100%	$ 19,150
-	140 St. south of 100 Ave.	1000088461	200	PVC	1980	2072	42	250	$ 1,313	100%	$ 55,107
-	105 Ave. east of City Parkway	1000089885	525	CP	1963	2073	24	600	$ 2,113	100%	$ 50,428
-	140 St. south of 100 Ave.	1000088463	200	AC	1974	2073	29	250	$ 1,313	100%	$ 37,482
-	138A St. north of 104 Ave.	1000092800	200	PVC	1982	2074	72	250	$ 1,313	100%	$ 94,593
-	98A Ave., west of King George Blvd.	1000082377	200	AC	1973	2074	55	250	$ 1,313	100%	$ 72,387
-	102 Ave. at University Dr.	1000080870	350	PVC	2001	2075	49	375	$ 1,591	100%	$ 78,060
-	Lane south of 100 Ave. at 134 St.	1000082358	200	PVC	1977	2075	40	250	$ 1,313	100%	$ 52,341
-	140 St. south of 100 Ave.	1000088462	200	AC	1974	2076	67	250	$ 1,313	100%	$ 88,085
-	111A Ave at Hilton Rd.	1000089774	200	VCP	1963	2077	76	250	$ 1,313	100%	$ 99,870
-	132A St. south of 108 Ave.	1000089942	200	AC	1963	2077	119	250	$ 1,313	100%	$ 155,967
-	Bentley Rd. at Hilton Rd.	1000092431	200	VCP	1963	2077	81	250	$ 1,313	100%	$ 105,921
-	140 St. south of 100 Ave.	1000088369	200	PVC	1997	2079	10	250	$ 1,313	100%	$ 12,490
-	132 St. at King George Blvd.	1000091666	450	CP	1963	2081	32	525	$ 1,938	100%	$ 61,982
-	138A St. north of 104 Ave.	1000092802	200	VCP	1963	2082	117	200	$ 1,200	100%	$ 140,028
-	140 St. south of 100 Ave.	1000088178	300	PVC	2006	2082	5	375	$ 1,591	100%	$ 8,343
-	102 Ave. east of Whalley Blvd	1000088132	350	DIP	1996	2083	34	375	$ 1,591	100%	$ 54,141
2044 - 2083 BO Gravity Sewer Sub-Total							3,171				$4,820,004
2013 - 2083 BO Gravity Sewer Sub-Total							11,277				$17,581,637

A12. DCC Eligible Gravity Main Upsizing Projects

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	DCC Eligible Capital Cost
-	Hilton Rd Diversion, Bentley Rd at Hilton Rd	-				2013	39	450	450	17,550
-	**2013**	**TOTAL**					**39**			**$17,550**
-	132 St north of 96 Ave	1000082350	200	AC	1973	2017	108	300	212	22,896
-	132 St north of 96 Ave	1000082351	200	AC	1973	2017	123	300	212	26,076
-	100 Ave at 143 St	1000088420	200	AC	1975	2018	95	300	212	20,140
-	100 Ave at 143 St	1000088421	200	AC	1975	2018	116	300	212	24,592
-	100 Ave at 140 St	1000088377	200	VCP	1972	2019	51	300	100	5,100
-	Lane east of King George Blvd, south of 105A Ave	1000092936	200	VCP	1963	2019	103	375	220	22,660
-	132 St at Old Yale Rd	1000082409	200	VCP	1963	2020	114	300	100	11,400
-	141 St at 101 Ave	1000088410	200	VCP	1972	2020	86	300	212	18,232
-	141 St at 101 Ave	1000088411	200	AC	1972	2020	69	300	212	14,628
-	132 St at Old Yale Rd	1000082411	200	VCP	1963	2021	125	300	100	12,500
-	140 St at 108 Ave	1000092691	150	VCP	1963	2021	15	250	112	1,680
-	141 St at 102 Ave	1000088408	200	VCP	1972	2022	99	250	112	11,088
-	King George Blvd at 108 Ave	2	375	PVC	2013	2022	52	600	800	41,600
-	100 Ave east of 143 St	1000088419	200	AC	1972	2023	79	250	112	8,848
-	141 St south of 102 Ave	1000088409	200	VCP	1972	2023	63	250	112	7,056
-	Grosvenor Rd at 108 Ave	1000092961	150	AC	1963	2023	7	300	100	700
-	**2014 - 2023**	**TOTAL**					**1,305**			**$249,196**
-	130 St south of 108 Ave	1000089879	200	VCP	1963	2024	116	250	112	12,992
-	132 St north of 96 Ave	1000082352	200	AC	1973	2024	91	250	112	10,192
-	130 St south of 108 Ave	1000089908	200	VCP	1963	2025	101	250	112	11,312
-	132 St south of Old Yale Rd	1000082141	200	AC	1963	2025	31	300	100	3,100
-	Bolivar Cres at King George Blvd	1000089787	200	VCP	1963	2025	94	375	275	25,850
-	111A Ave at 135A St	1000089778	150	VCP	1963	2026	54	250	112	6,048
-	140 St north of 106 Ave	1000092740	200	VCP	1963	2026	95	300	100	9,500
-	140 St north of 106 Ave	1000092741	200	VCP	1963	2026	95	300	100	9,500
-	140 St north of 106 Ave	1000092742	200	VCP	1963	2026	95	300	100	9,500
-	98B Ave, west of 134 St	1000082363	200	PVC	1977	2026	87	300	212	18,444
-	98A Ave west of 133A St	1000082369	200	PVC	1977	2027	42	300	212	8,904

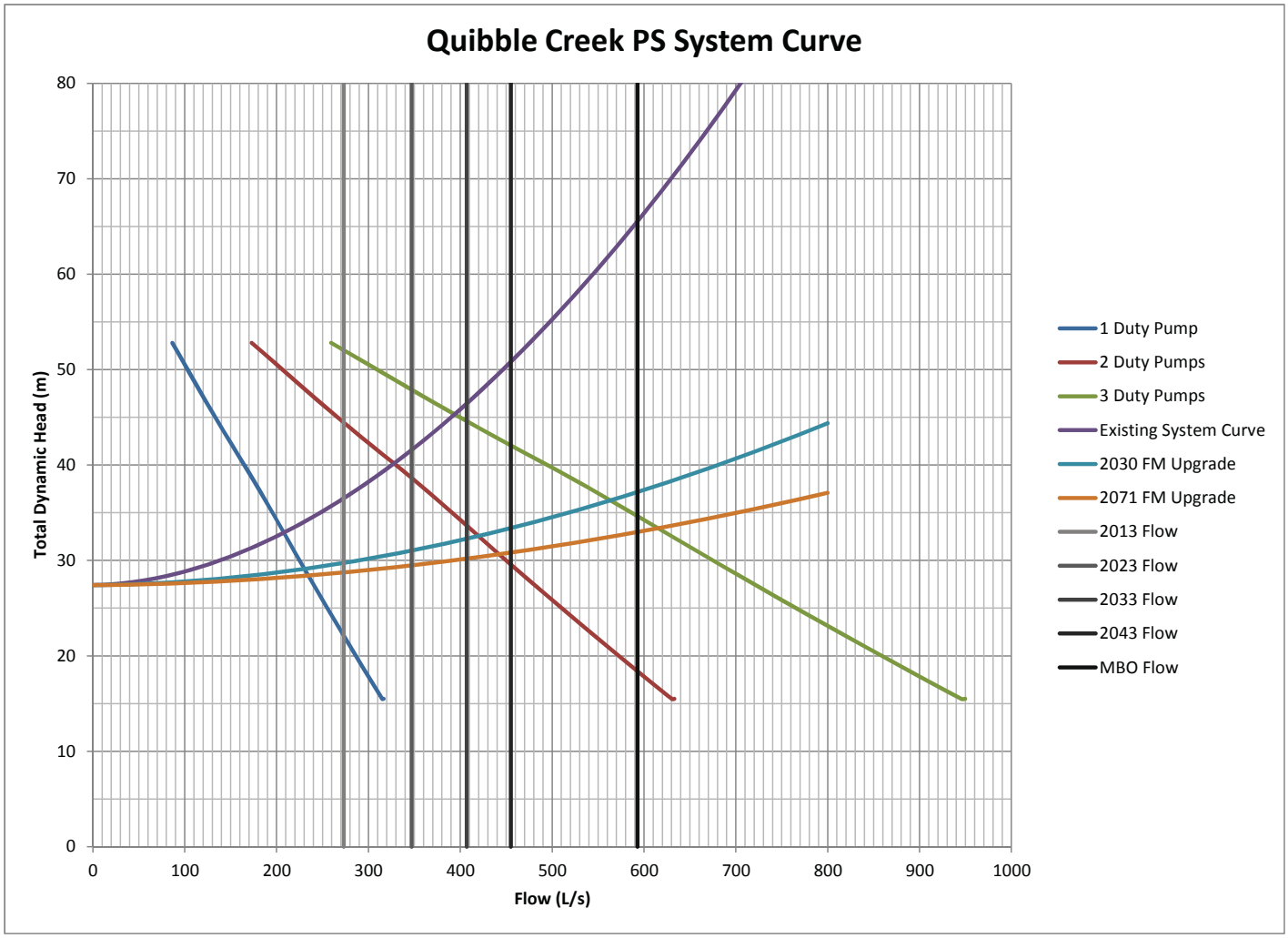
10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	DCC Eligible Capital Cost
-	Bolivar Cres at King George Blvd	1000089788	200	VCP	1963	2027	105	375	275	28,875
-	King George Blvd north of 108 Ave	3	300	PVC	2013	2027	19	525	625	11,875
-	Lane E of KG Blvd, S of 105A Ave	1000092935	200	VCP	1963	2027	94	300	100	9,400
-	109 Ave at 139A St	1000092447	150	VCP	1963	2028	56	250	112	6,272
-	132 St north of Old Yale Rd	1000082410	200	AC	1963	2028	4	300	100	400
-	108 Ave at 130 St	1000090176	200	VCP	1963	2029	114	250	112	12,768
-	King George Blvd at 108 Ave	1	375	PVC	2013	2029	11	600	800	8,800
-	139A St at 109 Ave	1000093033	150	VCP	1963	2030	130	250	112	14,560
-	96 Ave west of 134 St	1000082383	200	AC	1973	2030	95	300	212	20,140
-	Berg Rd at Cowan Rd	1000092956	150	VCP	1963	2032	111	250	112	12,432
-	132 St north of 109 Ave	1000090149	200	AC	1963	2033	106	300	100	10,600
-	Selkirk Dr at Cowan Rd	1000092448	150	VCP	1963	2033	119	250	112	13,328
-	**2024 - 2033**	**TOTAL**					**1,865**			**$274,792**
-	Lane W of KG Blvd S of 104 Ave	1000079424	200	AC	1973	2035	87	300	100	8,700
-	139A St at Brentwood Cres	1000093034	150	VCP	1963	2037	111	250	112	12,432
-	139A St north of 102 Ave	1000088385	200	VCP	1972	2037	112	300	100	11,200
-	Grosvenor Rd at Selkirk Dr	1000092451	200	VCP	1963	2037	102	300	212	21,624
-	Lane E of Whalley Blvd North of 105A Ave	1000092927	200	VCP	1963	2037	96	300	100	9,600
-	105A Ave east of City Parkway	1000089960	200	AC	1963	2038	93	300	100	9,300
-	Brentwood Cres at 139A St	1000093036	200	VCP	1963	2041	107	300	212	22,684
-	Antrim Rd east of Brentwood Cres	1000093040	200	VCP	1963	2042	77	300	212	16,324
-	**2034 - 2043**	**TOTAL**					**785**			**111,864**
-	96 Ave between 134 St and KG Blvd	1000081853	200	AC	1973	2044	108	300	100	10,800
-	105A Ave east of City Parkway	1000089958	200	AC	1963	2045	7	300	100	700
-	111 Ave east of 136 St	1000092945	150	VCP	1963	2046	117	250	112	13,104
-	133A St south of 104 Ave	1000082554	200	AC	1962	2047	76	300	100	7,600
-	133A St south of 104 Ave	1000082555	200	AC	1962	2047	75	300	100	7,500
-	100 Ave and Whalley Blvd	1000088371	200	PVC	1992	2048	17	300	100	1,700
-	Grosvenor Rd east of Brentwood Cres	1000093024	200	VCP	1963	2049	107	250	112	11,984
-	100A Ave east of 132 St	1000082421	200	AC	1974	2051	96	300	100	9,600
-	Antrim Rd east of Brentwood Cres	1000093041	200	VCP	1963	2055	77	250	112	8,624
-	100 Ave at KG Blvd	1000088370	200	PVC	1992	2056	96	300	100	9,600
-	100 Ave at KG Blvd	1000082167	200	PVC	1992	2059	84	300	100	8,400

10 Year Servicing Plan ID	Location	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost ($/m)	DCC Eligible Capital Cost
-	139 St south of 102 Ave	1000088383	200	AC	1972	2060	91	300	100	9,100
-	100 Ave east of 141 St	1000088278	300	PVC	2005	2062	109	375	388	42,292
-	133A St at 98B Ave	1000082362	200	PVC	1977	2064	47	250	112	5,264
-	Bentley Rd south of 110A Ave	1000092954	200	VCP	1963	2080	94	250	112	10,528
-	**2044 - BO**	**TOTAL**					**1,201**			**$156,796**
-	**2013 -- 2044 - BO**	**TOTAL**					**5,195**			**$810,198**

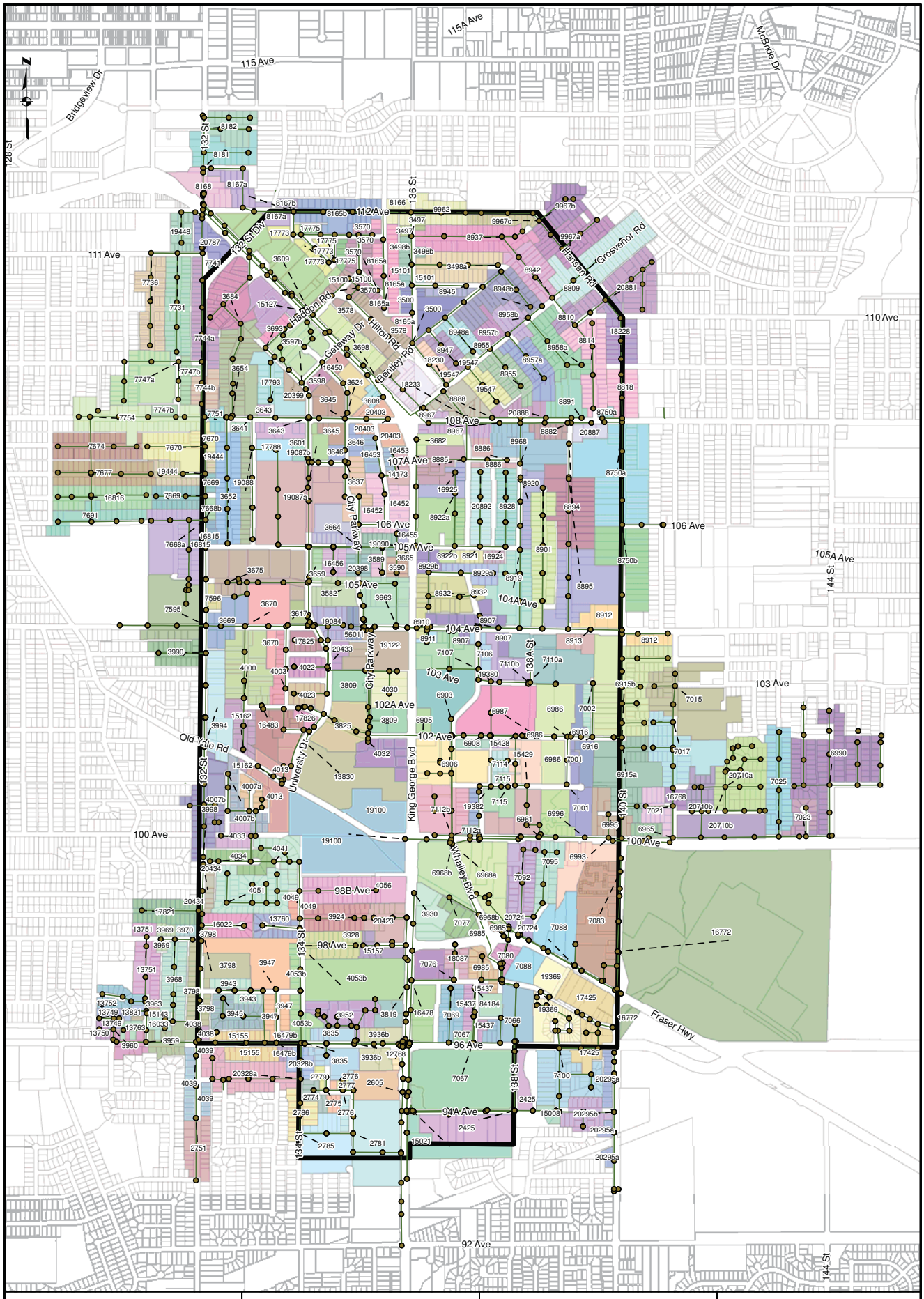
A13. DCC Eligible Pump Station & Forcemain Projects

Pump Station and Forcemain Upgrades											
10 Year Servicing Plan ID	Description	Pipe ID	Ex. Dia. (mm)	Ex. Material	Year Installed	Upgrade Year	Length (m)	Proposed Dia. (mm)	Unit Cost	Percent Attributable to City Centre	DCC Eligible Capital Cost
12721	Add 1 – 225 L/s pump to Quibble Creek Pump Station (4th Pump)	-	-	-	-	2019	-	-	$110,000.00	100%	$110,000
-	Twin 1598 m of 500 mm dia. forcemain w/ 675 mm dia.	-	500	DIP	1999	2030	1598	675	$ 2,125	100%	$ 3,395,750
-	Twin 718 m of 600 mm dia. forcemain w/ 600 mm dia.	-	600	DIP	1999	2073	718	600	$ 1,950	100%	$1,400,100
	Pump Station and Forcemain Sub-Total						2,316				$ 4,905,850
	DCC Eligible Projects Grand Total						**18,788**				**$ 23,297,685**

A14. Quibble Creek Pump Station System Curve


Quibble Creek PS System Curve
Total Dynamic Head (m)
Flow (L/s)
0
10
20
30
40
50
60
70
80
0
100
200
300
400
500
600
700
800
900
1000
1 Duty Pump
2 Duty Pumps
3 Duty Pumps
Existing System Curve
2030 FM Upgrade
2071 FM Upgrade
2013 Flow
2023 Flow
2033 Flow
2043 Flow
MBO Flow

A15. Assignment of Sewage Loadings by Sub-Catchment



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the future lives here.

Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

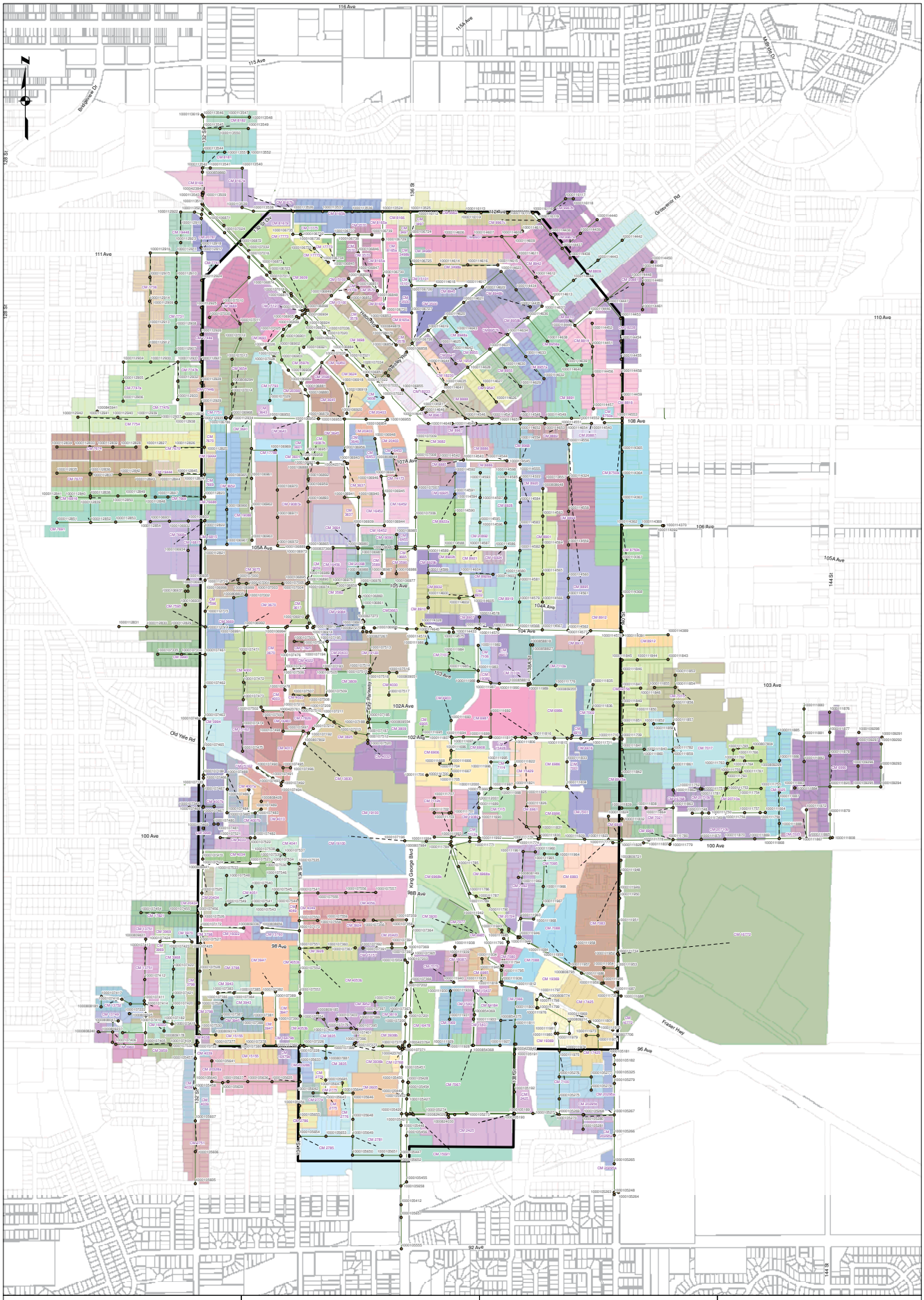
- Sanitary Manholes
- Sanitary Network
- City Centre Boundary

AECOM

0 50100 200 300 400 500 Meters

Sanitary Sub-Catchments Load Assignment

FIGURE A13



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Surrey City Centre Plan Update
Utility Servicing Strategy

Project No:	Date:
60278179	July 2014

Legend

- Sanitary Manholes
- Sanitary Network
- City Centre Boundary

AECOM

0 50100 200 300 400 500 Meters

Sanitary Sub-Catchments Load Assignment

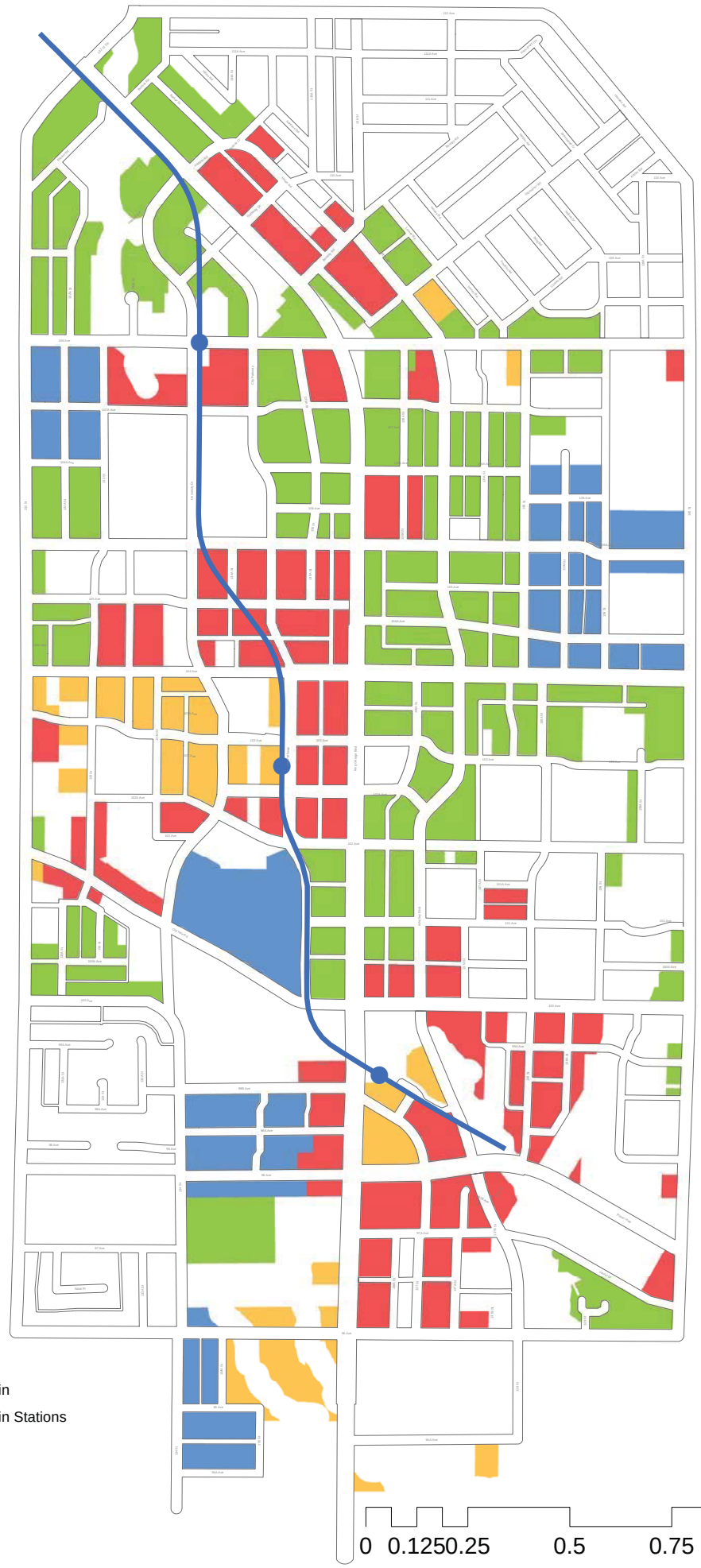
FIGURE A13

A16. City Centre Projected Growth Areas for Development Staging Scenarios

City Centre Projected Areas

N

1:4,500



Legend

- City Centre Skytrain
- City Centre Skytrain Stations

Projected Areas

- A
- B
- C
- D

0 0.1250.25 0.5 0.75 1 Kilometers

		2013			2023			2033			2043			2083		
	# of SF Parcels (2007)	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop
Polygon A	72	0%	38%	53	65%	100%	49	21%	100%	110	9%	100%	126	5%	100%	132
Polygon B	280	0%	38%	205	14%	100%	465	22%	100%	422	23%	100%	416	41%	100%	319
Polygon C	452	0%	38%	331	5%	100%	829	13%	100%	759	15%	100%	742	67%	100%	288
Polygon D	286	0%	38%	210	2%	100%	541	2%	100%	541	6%	100%	519	90%	100%	55
Existing	901	0%	38%	661	0%	100%	1,739	0%	100%	1,739	0%	100%	1,739	0%	100%	1,739
Total	1,991			1,460			3,622			3,570			3,542			2,533

	2013	**2023**	**2033**	**2043**	**2083**
General Population	32,352	48,820	68,288	88,564	158,066
Secondary Suite Population	1,460	3,622	3,570	3,542	2,533
Total Population	33,812	52,442	71,858	92,106	160,599

A-2.3

Consultant Report

WATER INFRASTRUCTURE

8 Water Infrastructure

The City of Surrey has updated their City Centre Plan, which predicts a dramatic increase in population that will place additional demands on the existing water transmission and distribution infrastructure, and will ultimately exceed the capacity of some existing pipelines. This study estimates water demands for five scenarios and identifies water infrastructure upgrades that will be required to support development. These scenario horizons are:

- Existing (based on Year 2013);
- Year 2023;
- Year 2033;
- Year 2043; and
- Build Out (Year 2083).

The City Centre study area includes approximately 550 hectares (Ha) of land and is generally bound by 132nd Street to the west, 140th Street to the east, 112th Avenue to the north and 96th Avenue to the south. The current City Centre Plan that reflects full build out conditions is shown in ***Figure 8.1.***

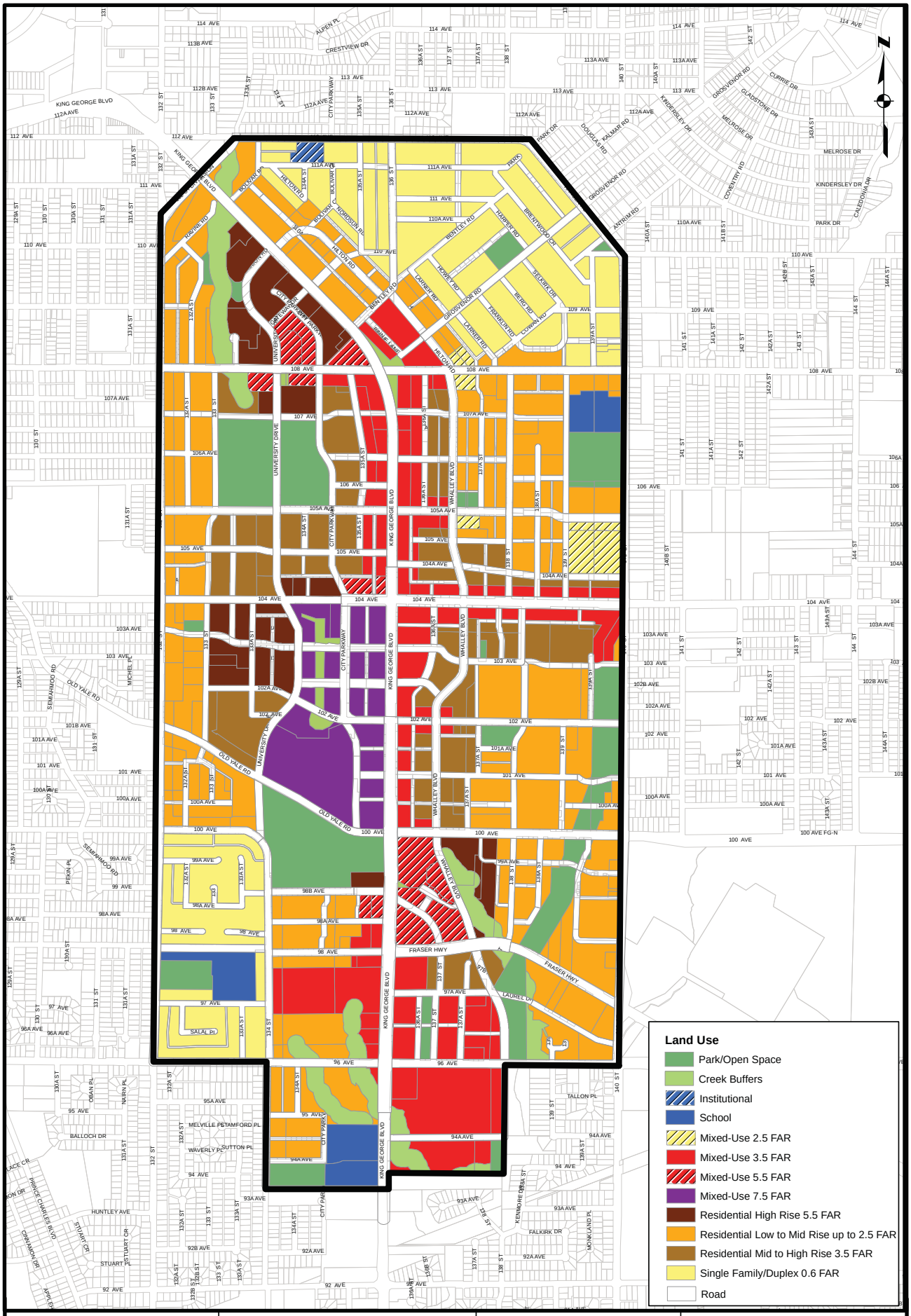
The City Centre area straddles the pressure zone boundary that separates the 135 m HGL Kennedy pressure zone from the 155 m HGL Whalley pressure zone. The 135 m HGL Kennedy pressure zone is generally served by the Kennedy pump station while the 155 m Whalley pressure zone is generally served by the Whalley pump station and the Whalley booster station.

The North Surrey hydraulic water model was utilized to identify existing and future hydraulic deficiencies and identify solutions to those deficiencies. We have assumed that the North Surrey hydraulic water model is calibrated appropriately for use in the current project. We assume that future water demands external to City Centre are based on the best planning information available and is a suitable representation of water demands outside of City Centre. Information for all future scenarios outside the City Centre was obtained from the *Model Development Summary* by Kerr Wood Leidal.

Key Objectives

This report was developed to address the following key objectives:

- Identify water demands for the Existing, 2023, 2033, 2043, and Build-Out planning horizons; and
- Develop phased servicing strategies that meet the water demand requirements for each of the five planning horizons.



City Centre Plan 2013 Update
Utility Servicing Strategy

Project No.	Date
60278179	August 2013

Legend

City Centre Boundary

200 100 0 200 Meters

City Centre Plan
(Build-Out)

FIGURE 8.1

Terms and Definitions

Table 8.1 provides a summary of key terms (with abbreviations) and definitions used throughout this report.

Table 8.1 Key Terms and Definitions

Key Term (and Abbreviation)	Definition
Average Daily Demand (ADD)	Annual water demand from all sources averaged to a single day.
Base Demand (BDD)	That part of water demand that is relatively unaffected by season or weather. Base Demand is largely indoor residential and ICI water use.
Diurnal Pattern	Pattern describing the variance in water-use over an entire day.
Fire Underwriters Survey (FUS)	Standard criteria developed by the Insurance Industry to evaluate fire services, including minimum fire flow and fire storage requirements.
Headloss	The head, pressure or energy (they are the same) lost by water flowing through a pipe, bend/deflection, valve, etc. as a result of friction.
Hydraulic Grade Line (HGL)	The surface or profile of water flowing. The level water would rise to in a small vertical tube connected to the pipe. (HGL = elevation + pressure).
IC	Institutional and Commercial, generally concerning water use sector and demand
WaterCAD	Computer software used to develop a model of the water distribution system and analyze flow and pressure hydraulics
North Surrey Hydraulic Model	North Surrey water model developed by Kerr Wood Leidal Associates (2004) and updated in 2008 by AECOM
Leakage ("water loss")	Water lost from the system through cracks in watermains, unseated valves, misaligned joints, reservoir cracks, overflows. (occurs on City watermains and on private services)
Million Litres (ML)	1 ML/day refers to 1 million litres of water per day
Maximum Day Demand (MDD)	Highest daily water usage over the entire year.
Peak Hour Demand (PHD)	Highest water usage for any given 1-hour period, over an entire year.
Pressure Reducing Valve (PRV)	A control valve that automatically reduces the inlet pressure in a watermain to a set downstream pressure.
Pressure Zone (PZ)	A water service area in which all the users have the same static HGL. Water cannot flow from one PZ to another without passing through a PRV or another control valve. PZ's are often isolated through the use of closed zone valves.
Seasonal Demand	That element of water demand that is impacted by season or weather. The largest part of seasonal demand is residential irrigation in the summer months.
Unit Conversions	
Pressure Psi to "m" or "kPa"	1.0psi = 0.70m = 7.0kpa (so 100psi = 70m = 700 kPa)
Volume Litres to gallons	3.79 Litres = 1.0 US gallon and 4.54 Litres = 1.0 Imp. gallon
HGL Geodetic to GVRD	0.0m Geodetic = GVRD Datum of 91.37 ft
Flow Rate L/s to gpm	1.0 L/s = 15.9 USgpm = 13.2 Imp. gpm

8.0 Existing & Future Servicing Catchments & Details

Existing studies and information utilized in the development of this report included:

- City Centre Plan;
- City of Surrey geodatabase;
- GIS shape files of City water distribution system, pressure zone boundaries, and pump stations;
- City of Surrey, 2004 Model Development Summary, Kerr Wood Leidal;
- City of Surrey, 2007 North Surrey Pump Station Study, Kerr Wood Leidal;
- City of Surrey, "Various Water System Modelling Assignments within the ALR and North and South Surrey" project in 2008 by AECOM (formerly Earth Tech);
- City of Surrey, "Surrey City Centre Water Servicing Strategy" project in 2014 by AECOM
- North Surrey WaterCAD Version 8.0 hydraulic model;
- Legal parcels and water supply network (GIS shapefile format);
- City of Surrey Design Criteria Manual 2004;
- GIS data for the water distribution system (i.e. pressure zones, PRVs, pipe networks, etc.); and
- Topographic information.

8.0.1 Equivalent Population Generation

Based on population projections provided by the City for the land use shown in ***Figure 8.1***, City Centre is expected to grow dramatically in the near future. This section identifies future populations as well as equivalent populations generated to determine water demands. ***Table 8.2*** below is a population summary for the various design horizons included in the Plan. These populations were developed specifically for predicting future water demands in City Centre and are not intended for other uses. It is important to note that there is no predicted industrial component in City Centre and therefore only institutional and commercial (IC) equivalent populations are generated.

For the existing Simon Fraser University (SFU), there are no residents living in this facility and only students and teachers are present. As such, the SFU equivalent population has already been accounted for in the 7.5 FAR where future residential units and apartments may be built.

Table 8.2 Summary of Water Populations Per Horizon Year

Horizon Year	Residential Population	Commercial Equivalent Population	Institutional Equivalent Population	Total Equivalent Population
Existing	33,812	23,585	2,754	**60,151**
2023	52,442	33,064	3,322	**88,828**
2033	71,858	42,543	3,904	**118,305**
2043	92,106	52,022	3,998	**148,126**
Build Out	160,599	89,937	4,601	**255,137**

Further details as to how these populations were generated are provided in ***Appendix B***.

8.0.2 Water Demand Unit Rates

Water demands generated in the North Surrey Hydraulic Water Model are divided into two basic categories:

1. **Base Demand Unit Rate:** Base demand (also called non-seasonal demand) is predominantly indoor water use that occurs on a daily basis regardless of season. This demand is sensitive to population and is represented on a per capita basis.

   The per capita demand utilized in this study for the calculation of base demand is **320 litres/capita/day (L/c/d)** resulting from an analysis of metered residential demands during the winter months, unmetered residential base demands, and an allowance for leakage (estimated at approximately 10%). This unit rate was developed as part of the 2005 KWL *Grandview Pump Station Pre-Design Report* and was utilized in the 2007 KWL *North Surrey Pump Station Study*. To calculate base demand for institutional land uses, the following unit rates were applied:

   - Schools = 45 (elementary) or 90 (secondary) L/c/d (Surrey Design Criteria);
   - Hospitals = 900 L/bed/d (Sewer Model, 2010 & MOH Standards, Health Act);
   - Retirement Homes = 650 L/bed/d (Sewer Model, 2010).

2. **Seasonal Demand Unit Rate:** The seasonal demand primarily represents outdoor irrigation that occurs during the summer months and is sensitive to irrigable area. In this study, Seasonal Demand is calculated on a unit area basis with future scenarios utilizing **0.39 litres/second/hectare (L/s/ha)** as the unit seasonal demand. This unit demand was developed as part of the 2004 water model development effort and is presented in the *2004 Water Model: Model Development* report by KWL.

It is important to separate the base demand representing indoor water use from the seasonal demands for irrigation. As City Centre develops, single family residential areas will be redeveloped into high density mid and high rise developments. High rise apartment dwellers have a lower per capita irrigation demand than single family home owners, due to the smaller amount of irrigable land per capita for the high rise dwellers. Therefore, estimating the irrigation demand based on population increase would over estimate MDD and PHD demands for high density development. This study bases seasonal demand on land area, which is related to irrigable area, and will provide a more accurate seasonal demand estimate for future scenarios.

It could be argued that mid and high rise developments often have built in water sprinkler systems and contract gardeners that maintain green space attached to these developments, therefore, irrigation for these developments is performed more regularly than a single family dwelling. We have assumed that differences in the ratio of irrigable area versus lot size between low density and high density development will be masked by the increase in more regular watering.

8.0.3 City Centre Base Day Demand (BDD)

All BDD scenarios were developed through multiplying the per capita BDD unit rate (320 L/c/d) by the residential, institutional, and commercial equivalent populations developed for each horizon.

8.0.4 City Centre Maximum Day Demand (MDD)

The MDD is the sum of the winter average BDD and the seasonal demand for all scenarios.

8.0.5 City Centre Peak Hour Demand (PHD)

PHD was calculated by combining the peak summer BDD and peak seasonal water demand. Peaking factors provided with the North Surrey Hydraulic Model were utilized for the existing scenario (1.33 for residential and 1.2 for commercial). All future scenarios utilize peaking factors developed from 2007 meter data from the Clayton area of Surrey. Peaking factors were developed for both the base and seasonal demands to better represent the difference between indoor water use and irrigation peaks. As City Centre population density increases, single family residential areas will be replaced with mid and high rise residential. Irrigation demands will be relatively independent of population for high density neighbourhoods and maintaining separate residential (base) and irrigation (seasonal) demands will provide a more accurate estimate of future PHD.

Base demand PHD peaking factors were further divided into residential and commercial water use sectors due to the significant differences in water use between these sectors. The Residential base demand peaking factor was estimated to be 1.7 using November 2007 bulk meter data from Clayton as a basis. For commercial and institutional land uses, the base demand peaking factor was estimated to be 1.2 based on previous studies completed for the Township of Langley and City of New Westminster.

A separate peaking factor of 2.1 was estimated for the seasonal demand based on August 2007 bulk meter data from Clayton. The seasonal demand peaks were assumed to be similar in both residential and IC land uses.

8.0.6 City Centre Fire Flow Demand (FF)

Fire flow demands are based on land use zoning. The City of Surrey Design Criteria Manual (2004) includes 52 separate zonings with five different fire flow values. For modelling purposes, the fire flow demands in the City of Surrey Engineering Department Design Criteria Manual (2004) is simplified to include three basic land uses in City Centre with three different fire flow values:

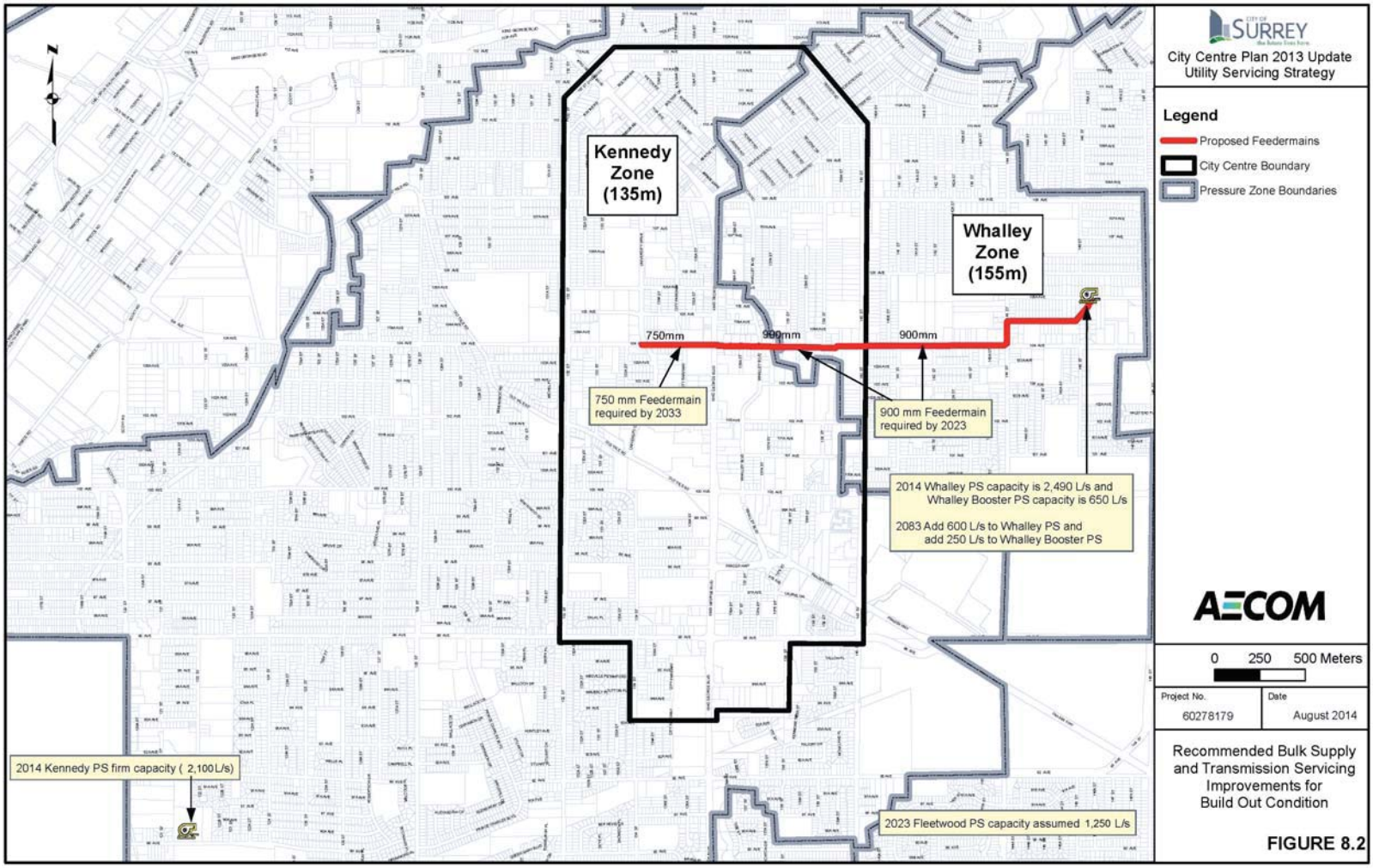
- Single Family Residential = 60 L/s;
- Multi-Family Residential = 200 L/s; and,
- Commercial and Institutional = 200 L/s.

This simplification will overestimate fire flow requirements for duplex residential, neighbourhood commercial and self-service gas station properties. However, there are few existing properties impacted by this simplification and future City Centre is largely dense commercial and residential development with higher fire flow requirements. Therefore, the impact of this simplification is marginal and does not impact the medium and long term infrastructure requirements in City Centre.

8.0.7 Water Demand Outside of City Centre

The North Surrey Hydraulic Model includes a large area that extends beyond the boundaries of City Centre. North Surrey includes 6 pressure zones (7 pressure sub-zones and 4 different HGLs) that cover 13,000 ha of land. City Centre represents 4% of the North Surrey land mass and has 7% of the North Surrey population. City Centre straddles the zone boundary between the Kennedy and Whalley pressure zones (as shown on ***Figure 8.2***) and includes 550 ha of land. As the City's well developed water network serves most of North Surrey, the ability of the water system to serve City Centre is heavily influenced by water demands of areas located outside City Centre.

The 2033 demand scenario in the North Surrey hydraulic model is considered the build out condition for areas external to City Centre. For the purposes of this study, we assumed that the existing and 2033 demands provided with the North Surrey Hydraulic Model are generally adequate for the areas outside of City Centre. A 2023 scenario was developed for the area external to City Centre through linear interpolation of the existing and 2033 demands. 2043 and 2083 horizons reflect the 2033 build out condition.


Kennedy Zone (135m)
Whalley Zone (155m)
750mm
900mm
900mm
750 mm Feedermain required by 2033
900 mm Feedermain required by 2023
2014 Whalley PS capacity is 2,490 L/s and Whalley Booster PS capacity is 650 L/s
2083 Add 600 L/s to Whalley PS and add 250 L/s to Whalley Booster PS
2014 Kennedy PS firm capacity (2,100 L/s)
2023 Fleetwood PS capacity assumed 1,250 L/s
CITY OF SURREY
City Centre Plan 2013 Update
Utility Servicing Strategy
Legend
Proposed Feedermains
City Centre Boundary
Pressure Zone Boundaries
AECOM
0 250 500 Meters
Project No. 60278179
Date August 2014
Recommended Bulk Supply and Transmission Servicing Improvements for Build Out Condition
FIGURE 8.2

There are two facilities that were added to the North Surrey Hydraulic Model which were not in the original version:

- **RCMP E-Division:** The RCMP E-Division is expected to have approximately 3,200 employees at build out. For E-Division, we have utilized a conservative water demand of 320 L/employee/d.

- **Jim Pattison Outpatient Care & Surgery Centre:** The Jim Pattison Outpatient Care & Surgery Centre is expected to have a maximum of 2,300 patients on any given day up until 2043; this is expected to increase to 3,200 patients under build out conditions. The water demand for this facility was based on 650 L/patient/d.

Both of these facilities and their water demands have been applied to all scenarios.

8.0.8 Water Model Scenarios

Table 8.3 provides a summary of the model scenarios developed for this study.

Table 8.3 Model Scenarios

No.	Scenario	Child Scenario
1	Existing BDD	2013 MDD + Fire Flow 2013 PHD
2	2023 BDD	2023 MDD + Fire Flow 2023 PHD
3	2033 BDD	2033 MDD + Fire Flow 2033 PHD
4	2043 BDD	2043 MDD + Fire Flow 2043 PHD
5	Build Out BDD	2083 MDD + Fire Flow 2083 PHD

8.0.9 Methodology for Water Demand Generation

Based on the unit rates established, information provided by the City, as well as background models previously developed for the City Centre area, water demands were generated for the City Centre Plan. ***Table 8.4*** summarizes the methodology for water demand generation.

Table 8.4 Methodology for Water Demand Generation

Year Horizon	Base Day Demand	Seasonal Demand	Max Day Demand	Peaking Factor	Peak Hour Demand	Fire Flow
	BDD	Seasonal	MDD	PF	PHD	FF
Existing	Calculated by multiplying PE* with Base Demand**	Based on seasonal demand unit rate*** and area for each land use type.	Taken from "North Surrey Hydraulic Model" (KWL, 2004; Updated AECOM 2008)	Obtained from "North Surrey Pump Station Study" (KWL, 2007)	PF x BDD + Peak Seasonal Water Demand	Fire Flows based on zoning taken from the "City of Surrey Criteria Manual" (2004), simplified to use Single-Family Residential **[60 L/s]**, Multi-Family Residential **[200 L/s]**, and Commercial and Institutional **[200 L/s]**
2023	Calculated by multiplying PE* with Base Demand**	Based on seasonal demand unit rate*** and area for each land use type.	Linear interpolation between existing MDD & 2033 MDD	Obtained from 2007 meter data from the Clayton area. IC PF from TOL & City of New Westminster	PF x BDD + Peak Seasonal Water Demand	Fire Flows based on zoning taken from the "City of Surrey Criteria Manual" (2004), simplified to use Single-Family Residential **[60 L/s]**, Multi-Family Residential **[200 L/s]**, and Commercial and Institutional **[200 L/s]**
2033	Calculated by multiplying PE* with Base Demand**	Based on seasonal demand unit rate*** and area for each land use type. At year 2033, City Centre seasonal demand usage does not change after this horizon.	Predicted 2033 BDD combined with Seasonal Water Demand from "2004 Water model: Model Development Study" (KWL)	Obtained from 2007 meter data from the Clayton area. IC PF from TOL & City of New Westminster	PF x BDD + Peak Seasonal Water Demand	Fire Flows based on zoning taken from the "City of Surrey Criteria Manual" (2004), simplified to use Single-Family Residential **[60 L/s]**, Multi-Family Residential **[200 L/s]**, and Commercial and Institutional **[200 L/s]**
2043	Calculated by multiplying PE* with Base Demand**	Based on seasonal demand unit rate*** and area for each land use type. At year 2033, City Centre seasonal demand usage does not change after this horizon.	Predicted 2043 BDD combined with Seasonal Water Demand from "2004 Water model: Model Development Study" (KWL)	Obtained from 2007 meter data from the Clayton area. IC PF from TOL & City of New Westminster	PF x BDD + Peak Seasonal Water Demand	Fire Flows based on zoning taken from the "City of Surrey Criteria Manual" (2004), simplified to use Single-Family Residential **[60 L/s]**, Multi-Family Residential **[200 L/s]**, and Commercial and Institutional **[200 L/s]**
Build Out	Calculated by multiplying PE* with Base Demand**	Based on seasonal demand unit rate*** and area for each land use type. At year 2033, City Centre seasonal demand usage does not change after this horizon.	Predicted 2083 BDD combined with Seasonal Water Demand from "2004 Water model: Model Development Study" (KWL)	Obtained from 2007 meter data from the Clayton area. IC PF from TOL & City of New Westminster.	PF x BDD + Peak Seasonal Water Demand	Fire Flows based on zoning taken from the "City of Surrey Criteria Manual" (2004), simplified to use Single-Family Residential **[60 L/s]**, Multi-Family Residential **[200 L/s]**, and Commercial and Institutional **[200 L/s]**

* *PE = Population Equivalent*

** *Base demand unit rate = 320 L/c/d, North Surrey Pump Station Study (KWL, 2007)*

*** *Seasonal demand unit rate = 0.39 L/s/ha, 2004 Water Model: model Development Study (KWL, 2004)*

^ *Allowance for leakage = 10% of Base Demand*

8.1 Design Criteria and Analysis

8.1.1 Evaluation and Design Criteria

Evaluation and design criteria are based on the City of Surrey's Design Criteria Manual (May 2004). The following minimum pressure criteria were used for the assessment of the water system:

- Maximum Day Demand plus Fire Flow (MDD+FF) Condition – A minimum residual pressure of 14 m (20 psi) is required at all nodes in the system.
- Peak Hour Demand (PHD) Condition – A minimum pressure of 28 m (40 psi) is required at all nodes in the system.

For the watermain upgrades, the recommended long term infrastructure improvement scenario assumes that existing distribution system infrastructure within City Centre will be upgraded to a minimum 250mm diameter size when the watermains reach the end of their useable life or as development proceeds. In addition, the City also requires that all watermains be looped within City Centre.

The developer must provide adequate service as per the City's Design Criteria and all development is required to upgrade the frontage main to the minimum 250mm diameter size and connect to the feedermain. Developers may also be required to replace all associated watermains from the feedermain to the development site.

8.1.2 Existing Water Model

The North Surrey hydraulic model represents the pipe network serviced by the Kennedy, Whalley and Newton pump stations. This network supplies water to over 300,000 residents in North Surrey. The North Surrey water model was originally developed in 2004 by Kerr Wood Leidal Associates. The model was updated as part of the *Various Water System Modelling Assignments within the ALR and North and South Surrey* project in 2008 by AECOM (formerly Earth Tech).

Specific details about the existing pipe network and system demands can be found in the *North Surrey Pump Station Study* completed by Kerr Wood Leidal Associates Limited in June 2007. We have assumed that the hydraulic model provided by the City is calibrated and has adequate population distributions and demand allocations for associated scenarios for areas outside of City Centre.

8.1.3 Existing Water System Assessment

It is important to note that there are some areas within City Centre that do not currently meet the PHD pressure criteria of a minimum 40 psi. If City Centre grows as predicted, existing pressure issues may increase if no improvements are made to the system.

8.1.4 Demand Allocation

The future City Centre water demands were developed at the parcel level. Demands were assigned from the GIS parcels to the nearest pipe and model node utilizing GIS special allocation tools. Segregation of demands by land use at the node level was maintained to facilitate manipulation of demands with peaking factors and diurnal patterns specific to land use.

Fire flow demands were assigned based on land use and fire flow demands previously identified. For nodes that are adjacent to several different land use zonings (i.e. multi-family residential and commercial), the higher required fire flow governed and was assigned to the node.

8.1.5 Future Water Model Demands

Table 8.5 summarizes water demands utilized in the North Surrey Hydraulic Model for each horizon.

Table 8.5 North Surrey Model Demand Summary

Horizon Year	Demand	City Centre (L/s)	Outside City Centre (L/s)
Existing	BDD	222	1,040
	MDD	335	2,633
	PHD	624	4,353
2023	BDD	328	1,673
	MDD	468	3,985
	PHD	797	6,512
2033	BDD	436	2,208
	MDD	615	5,026
	PHD	1,019	8,170
2043	BDD	549	2,208
	MDD	727	5,026
	PHD	1,189	8,170
Build Out	BDD	945	2,214
	MDD	1,115	5,034
	PHD	1,762	8,182

8.1.6 Future Base Upgrades

The existing pipe network and pump station arrangement does not have capacity to support the projected future demand scenarios. Model runs identified large numbers of failed nodes in all of the Future PHD and Maximum Day plus Fire Flow (MDD+FF) scenarios. Without water system improvements the City will experience difficulty in meeting their peak hour and fire flow requirements.

All water model scenarios include the following zone boundary improvements.

Base Zone Boundary Improvements

The recommended adjustment to the boundary between the Kennedy (135m) and Whalley (155m) pressure zones, as reported in the *Whalley 155m Zone Extension* report, was included in all scenarios. The boundary shift into the Kennedy zone results in an increase in demand in the Whalley zone to address low water pressure concerns near the zone boundary during periods of peak water demands.

8.1.7 Future Fleetwood Reservoir

The future Fleetwood Reservoir being constructed by Metro Vancouver will provide a source of water supply to part of the 135m zone, thereby freeing up capacity at the Whalley Station for City Centre. The reservoir is planned to be in operation before the year 2023. For this analysis it is assumed that the future Fleetwood Reservoir and the existing Fleetwood Pump Station with the installed capacity of 1,250L/s at 135m HGL will be capable of meeting the demand in 2023. Further upgrades of Fleetwood Pump Station and the network in Fleetwood would be required after 2023, and the costs will be covered by City wide DCCs which are not assessed in this report.

8.2 Recommended Improvements and Costs

8.2.1 Bulk Supply and Feedermain Improvements

A summary of the demands for the Whalley (155m) and Kennedy (135m) zones in City Centre is provided below in ***Table 8.6***.

Table 8.6 Peak Hour Demand Summary by Zone

Horizon	Whalley (155m) Zone in City Centre (L/s)	Whalley (155m) Zone Total (L/s)	Kennedy (135m) Zone in City Centre (L/s)	Kennedy (135m) Zone Total (L/s)
Existing	217	374	406	1,080
2023	294	482	524	1,322
2033	337	574	688	1,694
2043	386	623	806	1,814
Build Out	527	763	1,247	2,259

*Note: City Centre zone demand include periphery nodes such that sum does not equal values in **Table 8.5***

To service the increase in water use leading up to the build out condition, the water servicing plan outlined in this Section, includes upgrades to infrastructure located both inside and outside the City Centre Plan boundaries. Recommendations for servicing are based on a 2023 in service date for the future MV Fleetwood Reservoir and changes to the Kennedy/Whalley pressure zone boundaries.

Table 8.7 Recommended Upgrades – Bulk Supply and Feedermains

Horizon Year	Major Infrastructure Upgrades	Estimated Cost
2023	Replace existing 600mm and 750mm diameter watermain with 2,312m of 900mm diameter ductile iron feedermain from the Whalley Pump Station, along 104 Avenue to King George Boulevard.	$6,936,000
2033	Install 365m of 750mm dia. ductile iron feedermain, extending from the 900 mm feedermain at King George Boulevard and 104 Avenue, along 104 Avenue to University Drive.	$876,000
2043	None	$0
Build Out	Upgrade Whalley PS to its firm capacity of 3,020 L/s with one additional 600 L/s pump	$750,000
	Upgrade Whalley Booster PS to its firm capacity of 900 L/s with one additional 250 L/s pump	$500,000
	TOTAL	$9,062,000

The proposed system utilizes water from the Whalley Pump Station to meet the increasing water demands in City Centre. This system employs a feedermain that directly connects the Whalley Pump Station to the Kennedy 135 m HGL pressure zone, and requires Whalley Main and Whalley Booster pump stations to be upgraded. The recommended upgrades are graphically presented in ***Figure 8.2***.

8.2.2 Distribution and Major Grid Main Capacity Improvements

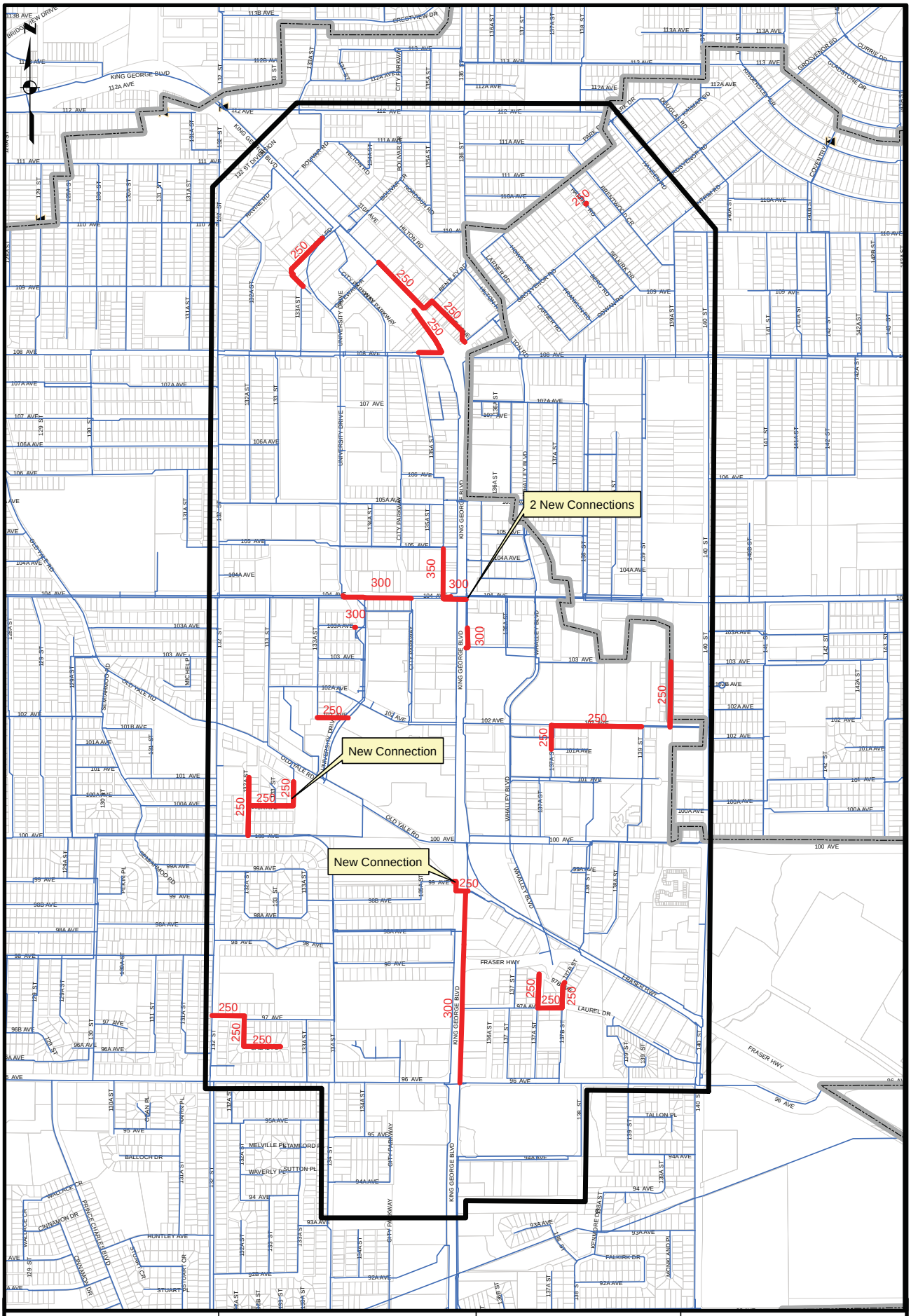
Pipe capacity driven network improvements are required for servicing the City Centre. The capacity based improvement plan assumes that existing distribution mains that reach the end of their useful life are replaced by 250 mm diameter watermains as part of the City's ageing infrastructure replacement program. *Only distribution mains that require capacity improvements prior to their ageing infrastructure replacement date are included in the capacity improvement program*. Current City policy is to contribute to increases in pipe size after the Developer has paid for the size of main they need for the development. All upsizing costs are paid with DCCs. ***Table 8.8*** summarizes the cost for upgrades to the water network.

Table 8.8 Summary of Distribution and Major Grid Main Capacity Upgrades

Upgrade Year	# of Pipes	Total Length (m)	Total Cost	DCC Eligible
Existing	26	2,960	$3,140,300	$71,150
2023	-	-	-	-
2033	-	-	-	-
2043	-	-	-	-
Build Out	15	768	$856,500	$185,550
Totals	**49**	**3,728**	**$3,996,800**	**$256,700**

The minimum pipe diameter for a City Centre pipeline is 250 mm as per the City's Standard. A summary of all the distribution network capacity upgrades is provided in ***Appendix B*** along with a summary of the major system and DCC-eligible upgrades.

As shown in ***Table 8.8***, the water model predicts that upgrades to distribution and major grid mains are required for both the existing and build out condition as properties within the service area become more densely developed. ***Figure 8.3*** shows approximately 3.6 km of capacity related upgrades that are capacity driven based on fire flow requirements. There are four new connections added to increase the water distribution network redundancy and looping. ***Figure 8.4*** shows 768m of replacement watermain required due to PHD and MDD+FF capacity concerns predicted for the build out condition.



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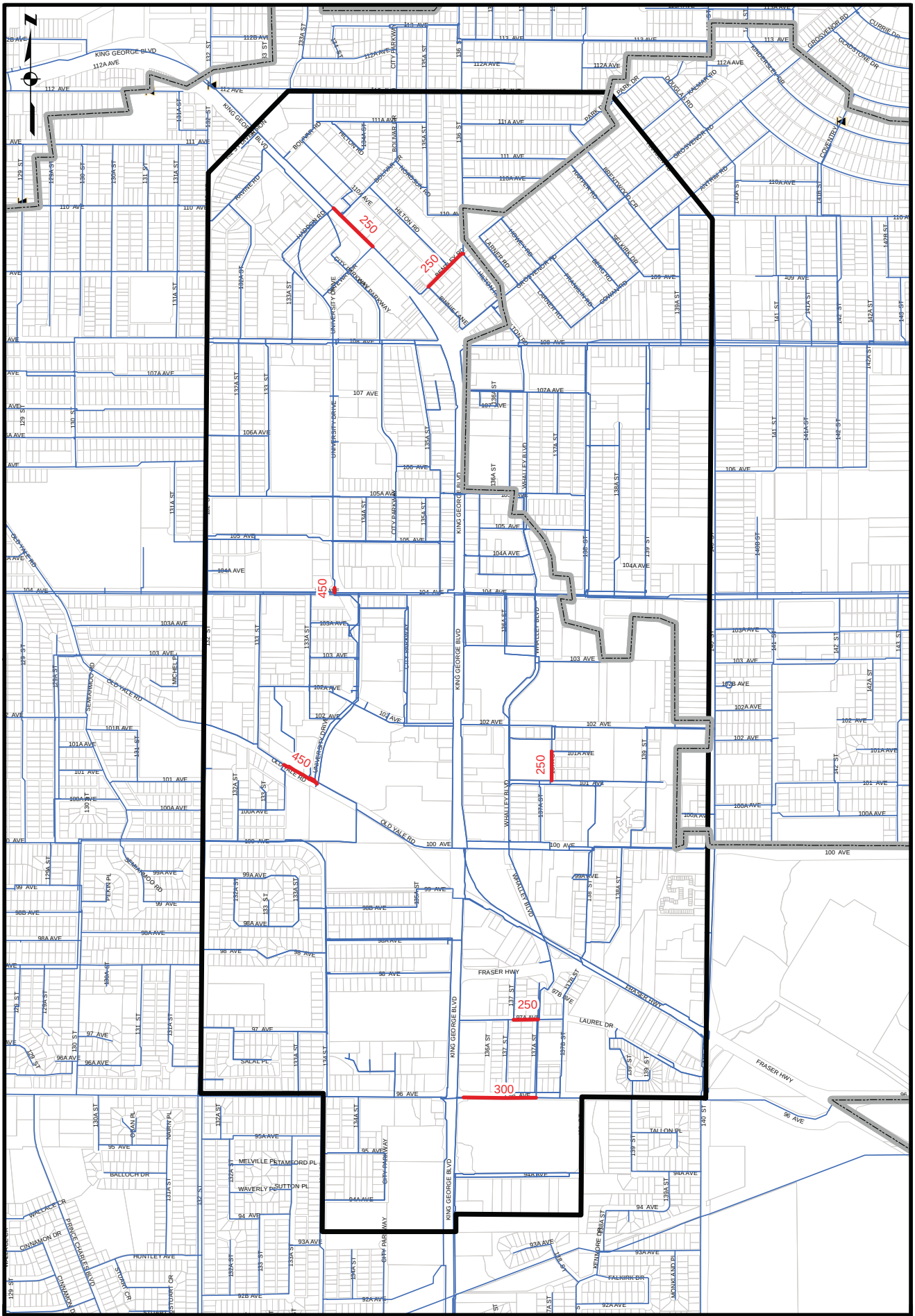
Legend

- Capacity Based Upgrades for Existing Land-Use
- City Centre Boundary
- Pressure Zone Boundaries
- Existing Pipes

200 100 0 200 Meters

2013 Recommended Capacity Upgrades

FIGURE 8.3



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Legend

- City Centre Required Capacity Based Upgrades
- Pressure Zone Boundaries
- City Centre Boundary
- Existing Pipes

AECOM

200 100 0 200 Meters

2083 (Build Out)
Recommended
Capacity Upgrades

FIGURE 8.4

8.2.3 PHD and MDD+FF Results

Peak hour demand (PHD) pressures and velocities as well as maximum day demand plus fire flow (MDD+FF) pressures are shown for each horizon in ***Figures 8.5 to 8.14***, and are further explained below.

Existing Horizon
Results for the PHD and MDD+FF model runs are shown in ***Figures 8.5 and 8.6*** respectively. The residential area near 132 Street and 100 Avenue marginally meets the peak hour pressure requirement of 40psi. This is due to the local high elevation relative to the rest of the Kennedy 135 m HGL pressure zone. Fire flow requirements were not met at 12 locations within City Centre. The fire flow requirements at these locations could be met by upgrading all mains to the minimum City Centre size of 250mm diameter.

2023 Horizon
Results for the PHD and MDD+FF model runs are shown in ***Figures 8.7 and 8.8*** respectively. The residential area near 132 St and 100 Avenue marginally meets the peak hour pressure requirement of 40 psi. This is due to the local high elevation relative to the rest of the Kennedy 135 m HGL pressure zone. This observation applies to each horizon. Fire flow requirements were not met at 7 locations within City Centre where the multi-family flow requirement is 200 L/s. The fire flow requirements at these locations could be met by upgrading all mains to the minimum City Centre size of 250 mm.

2033 Horizon
Results for the PHD and MDD+FF model runs are shown in ***Figures 8.9 and 8.10***. Fire flow requirements were not met at 10 locations within City Centre where the multi-family flow requirement is 200 L/s. The fire flow requirements at these locations could be met by upgrading all mains to the minimum City Centre size of 250 mm.

2043 Horizon
Results for the PHD and MDD+FF model runs are shown in ***Figures 8.11 and 8.12***. Fire flow requirements were not met at 11 locations within City Centre where the multi-family flow requirement is 200 L/s. The fire flow requirements at these locations could be met by upgrading all mains to the minimum City Centre size of 250 mm.

Build Out Horizon
Results for the PHD and MDD+FF model runs are shown in ***Figures 8.13 and 8.14***. There are a number of nodes such as those located at 133 St north of 100Avenue, which is an elevated area and does not meet the peak hour pressure requirement of 40psi. Due to the elevation of these locations, the low pressures cannot be resolved without very large infrastructure upgrades. The minimum peak hour pressure within City Centre is 36 psi. Fire flow requirements were not met at 4 locations within City Centre where the multi-family flow requirement is 200 L/s. The fire flow requirements at these locations could be met by upgrading all mains to the minimum City Centre size of 250 mm.

The recommended water servicing strategy for City Centre from present day to build out is a marriage of the recommended bulk supply and feedermain improvements and the recommended distribution and major grid main improvements detailed in ***Sections 8.2.1*** and ***8.2.2***. It should be noted that in order to meet the fire flow requirement of 200L/s for multi-family developments at all locations, the recommended system improvements, as well as upgrading of all local distribution mains to the City Centre minimum size of 250mm diameter is required. A detailed schedule of recommended water system improvements is tabulated in ***Appendix B*** including existing infrastructure description (if applicable), replacement or new infrastructure description and estimated implementation date and cost. A summary of estimated long term implementation cost is presented in ***Table 8.9***. All of the infrastructure improvements are directly related to increases in City Centre water demand and 100% attributable to City Centre re-development.

Table 8.9 Recommended Improvement Program Cost Summary

Recommended Improvements	Total Cost Attributable to City Centre
Bulk Supply and Feedermain Improvements	$9,062,000
Distribution & Major Grid Main Capacity Upgrades	$3,996,800
Capacity Improvement Total	**$13,058,800**

A snapshot of the overall system capacity versus demand with the water servicing strategy and the Build Out distribution network upgrades implemented is provided in ***Table 8.10*** below.

Table 8.10 Demand vs Capacity

Horizon Year	North Surrey Demand (L/s)	City Centre Demand (L/s)	Pumped Supply* (L/s)	Kennedy PS (L/s)	Newton PS (L/s)	Fleetwood PS (L/s)	Whalley PS (L/s)	Whalley Booster PS (L/s)
PHD Flows								
Existing	4,977	624	4,669	1,315	1,381	-	1,973	434
2023	7,309	797	6,541	1,392	1,882	1,223	2,044	479
2033	9,189	1,019	8,279	1,623	2,345	1,969	2,342	582
2043	9,359	1,189	8,446	1,657	2,350	1,991	2,448	655
Build Out	9,944	1,762	9,043	1,756	2,366	1,978	2,943	846
Firm Pump Station Capacities								
Existing	-	-	6,790	2,100	2,200	-	2,490	650
2023	-	-	8,890	2,100	2,200	1,250	2,490	650
2033	-	-	8,890	2,100	2,200	2,100	2,490	650
2043	-	-	8,890	2,100	2,200	2,100	2,490	650
Build Out	-	-	9,420	2,100	2,200	2,100	3,020	900

**Does not include Whalley Booster PS*

8.3 10-Year Servicing Plan

DCC eligible projects for build out of the City Centre Plan total $9,318,700 with some of the upgrades already included in the current 10-Year Servicing Plan (2014 – 2023). It is recommended that all of the DCC eligible projects be included in future 10-Year Servicing Plans. There may be projects shown in Figure 8.3 and 8.4 that have already been constructed, thus are not included in the following list.

List of DCC Eligible Projects

10 Year Servicing Plan ID	Pump Stations	# of New Pumps		Upgrade Year	Unit Cost ($/m)	Cost
-	Add 1 – 600 L/s pump to Whalley Main Pump Station*	1		2083	$750,000	$750,000
-	Add 1 – 250 L/s pump to Whalley Booster Pump Station*	1		2083	$500,000	$500,000
	Feedermains	**Length (m)**	**Dia. (mm)**	**Upgrade Year**	**Unit Cost ($/m)**	**Cost**
13901	104A Avenue: Whalley Pump Station- 144 Street	525	900	2023	$3,000	$1,575,000
13901	144 Street 104A Avenue - 104 Avenue	135	900	2023	$3,000	$405,000
11510	104 Avenue: 144 Street - King George Boulevard	1,652	900	2023	$3,000	$4,956,000
	104 Avenue: King George Boulevard - University Drive	365	750	2033	$2,400	$876,000
	Bulk Supply and Feedermain Total Cost					**$9,062,000**

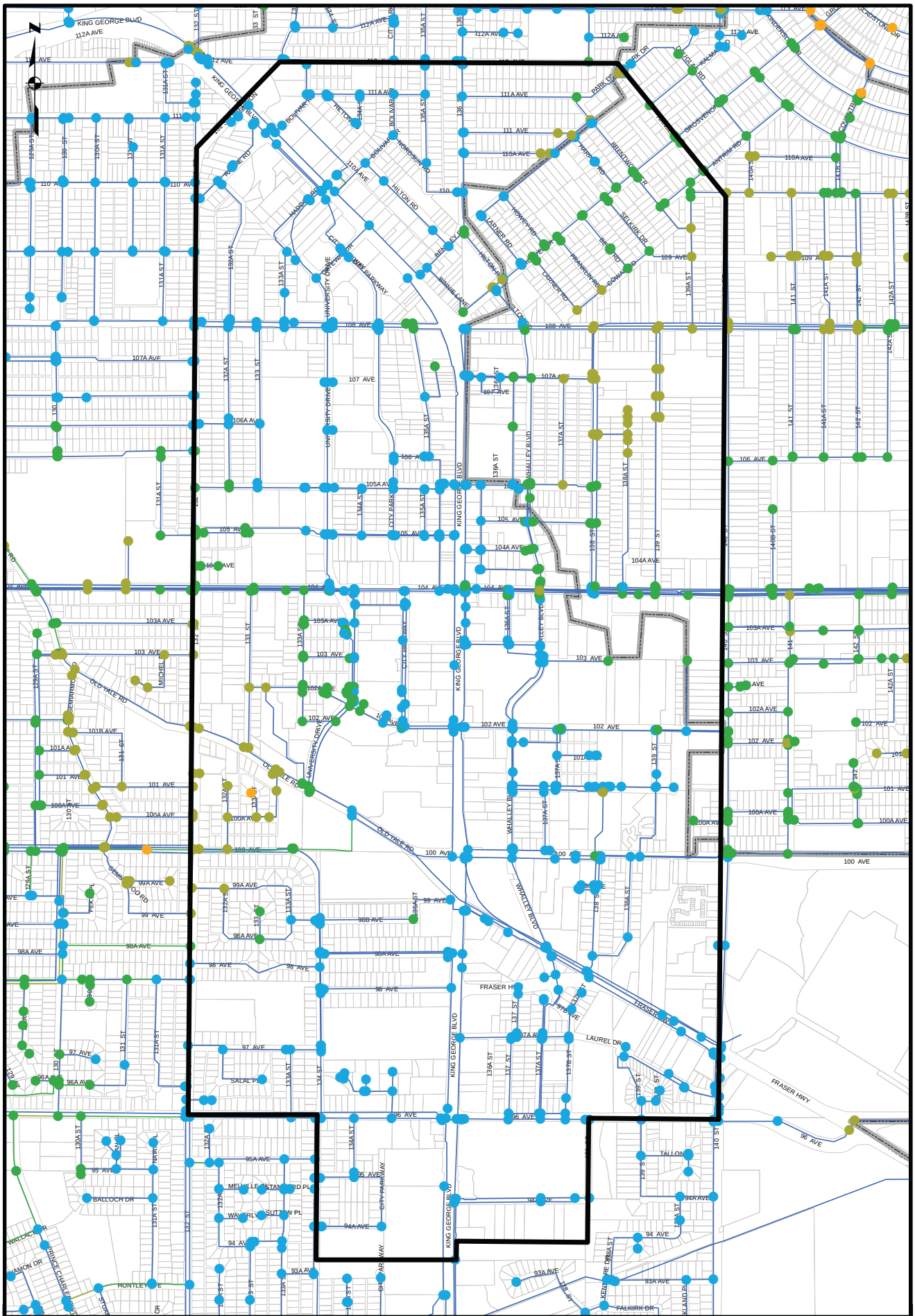
No land acquisition costs required. A spare pump bay is available at each pump station.

Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

List of DCC Eligible Projects continued

10 Year Plan ID	Distribution and Major Grid Main Capacity Upgrades	Priority	Length (m)	Prop. Dia. (mm)	Unit Cost ($/linear m)	Cost
-	104 Avenue: lane - east side KG Blvd. - New Connection	N	37	350	$1,200	$44,400
13799	King George Blvd. (east side) south of 104 Avenue	U/N	8	300	$50	$400
			64	300	$50	$3,200
7792	King George Blvd: 96 Avenue - 99 Avenue	U/N	249	300	$50	$12,450
			214	300	$50	$10,700
-	Old Yale Rd west of University Drive	N	81	450	$1,400	$113,400
		N	13	450	$1,400	$18,200
11510	University Drive at 104 Avenue	N	9	450	$1,400	$12,600
		N	6	450	$1,400	$8,400
-	University Drive at Old Yale Rd - New Connection	N	20	450	$1,400	$28,000
-	96 Avenue: 137A St - 137B St	U/N	99	300	$50	$4,950
	TOTAL					**$256,700**

Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.
U = upsizing contribution
N = NCP dependent



Legend

Pressure (psi) / Velocity (m/s)

- < 40 / < 0.5
- 40 - 50 / 0.5 - 1.0
- 50 - 60 / 1.0 - 1.5
- 60 - 70 / 1.5 - 2.0
- > 70 / > 2.0

City Centre Boundary

Pressure Zone Boundaries

Existing PRVs

200 100 0 200 Meters

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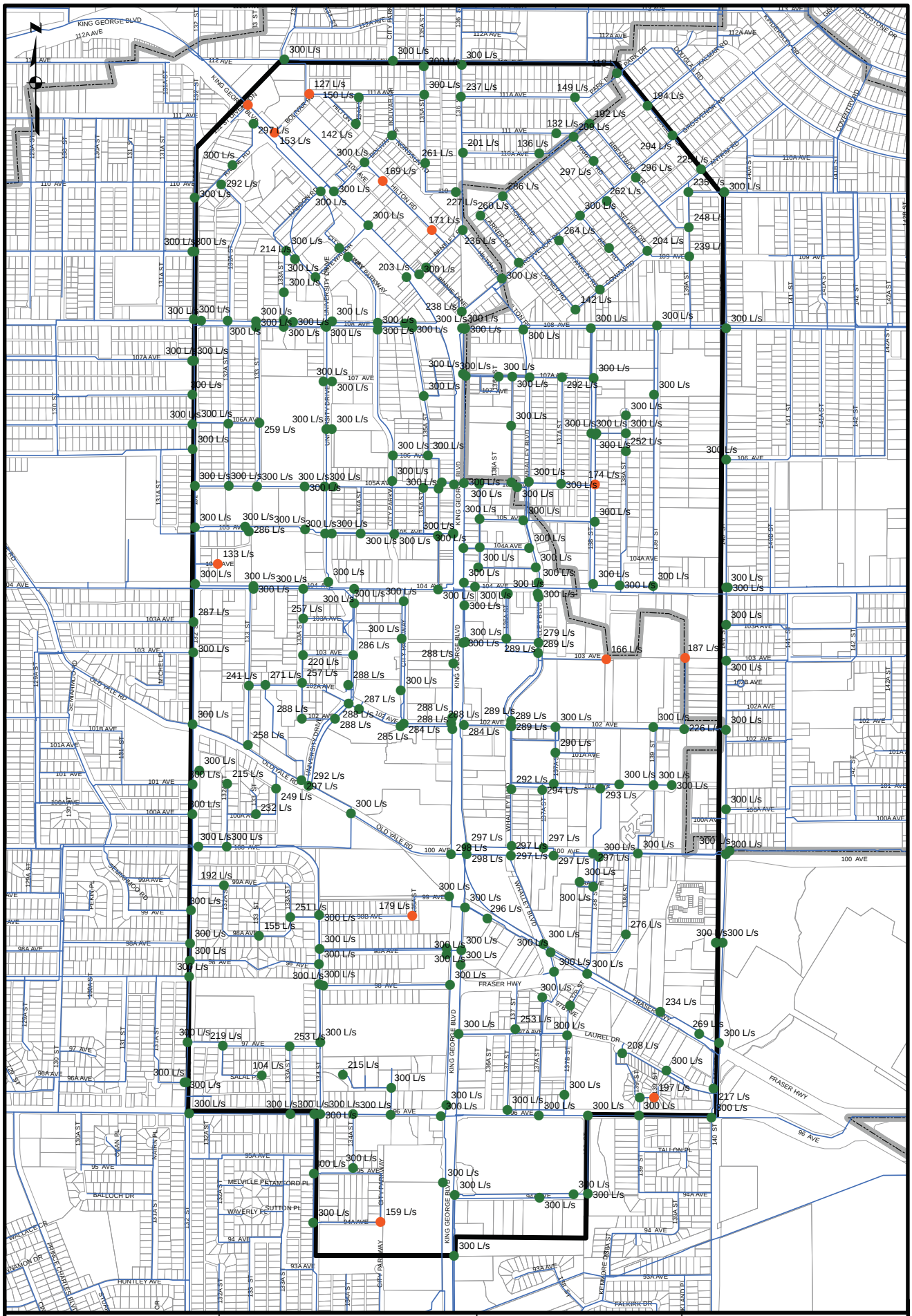
2013 (Existing) Horizon PHD Pressure & Velocity with Improvements

FIGURE 8.5



Legend

- Insufficient Fire Flow
- Insufficient Fire Flow - Requirements can be achieved if mains are upgraded to the minimum City Centre sizing of 250 mm
- Sufficient Fire Flow
- Watermains
- City Centre Boundary
- Pressure Zone Boundaries

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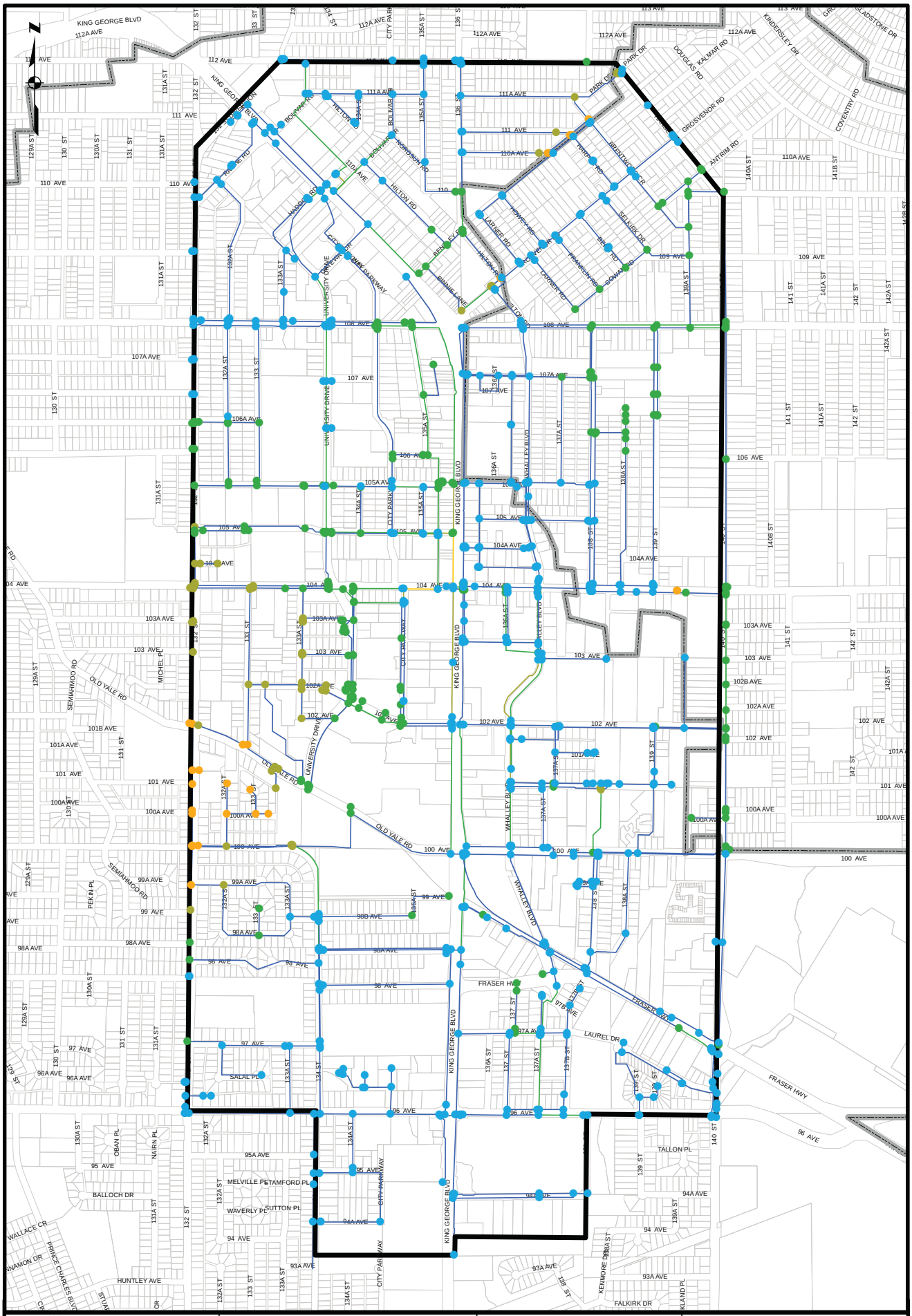
200 100 0 200 Meters

2013 Horizon
MDD+FF
with Improvements

FIGURE 8.6



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Legend

Pressure (psi)	Velocity (m/s)
< 40	< 0.5
40 - 50	0.5 - 1.0
50 - 60	1.0 - 1.5
60 -70	1.5 - 2.0
> 70	> 2.0

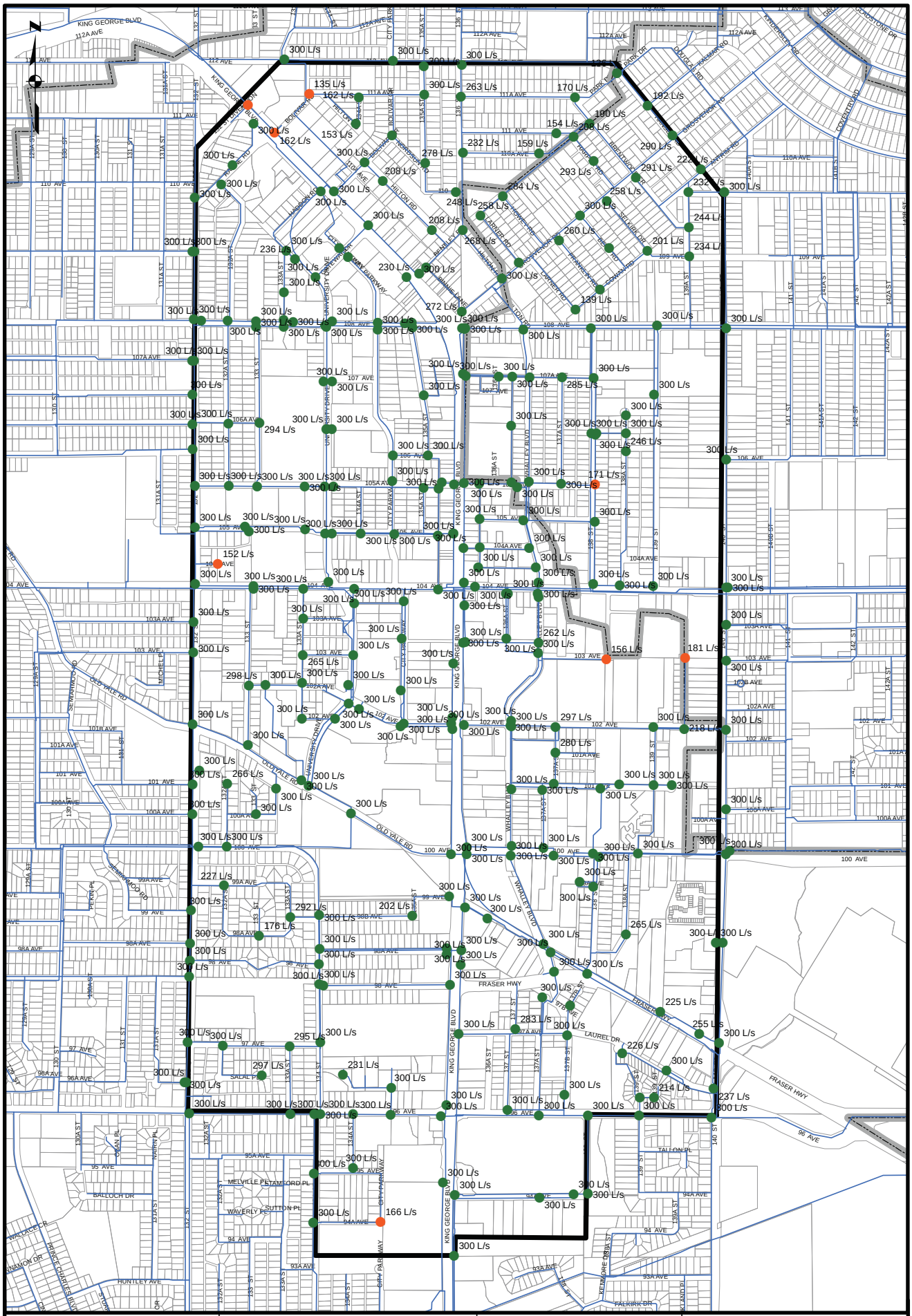
City Centre Boundary
Pressure Zone Boundaries

AECOM

200 100 0 200 Meters

2023 Horizon
PHD Pressure & Velocity
with Improvements

FIGURE 8.7



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Legend

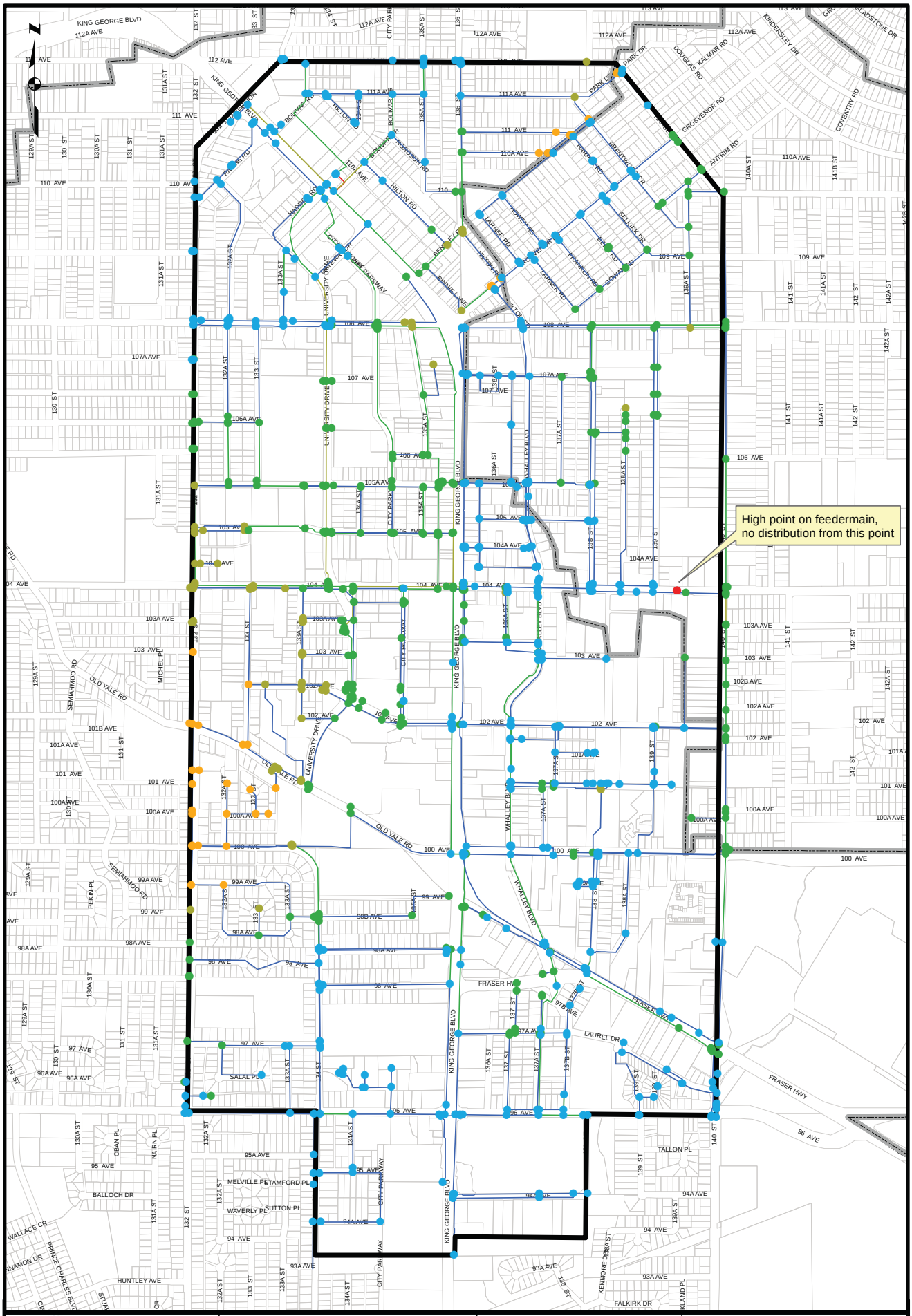
- Insufficient Fire Flow
- Insufficient Fire Flow - Requirements can be achieved if mains are upgraded to the minimum City Centre sizing of 250 mm
- Sufficient Fire Flow
- Watermains
- City Centre Boundary
- Pressure Zone Boundaries

AECOM

200 100 0 200 Meters

2023 Horizon
MDD+FF
with Improvements

FIGURE 8.8



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Legend

Pressure (psi)	Velocity (m/s)
< 40	< 0.5
40 - 50	0.5 - 1.0
50 - 60	1.0 - 1.5
60 -70	1.5 - 2.0
> 70	> 2.0

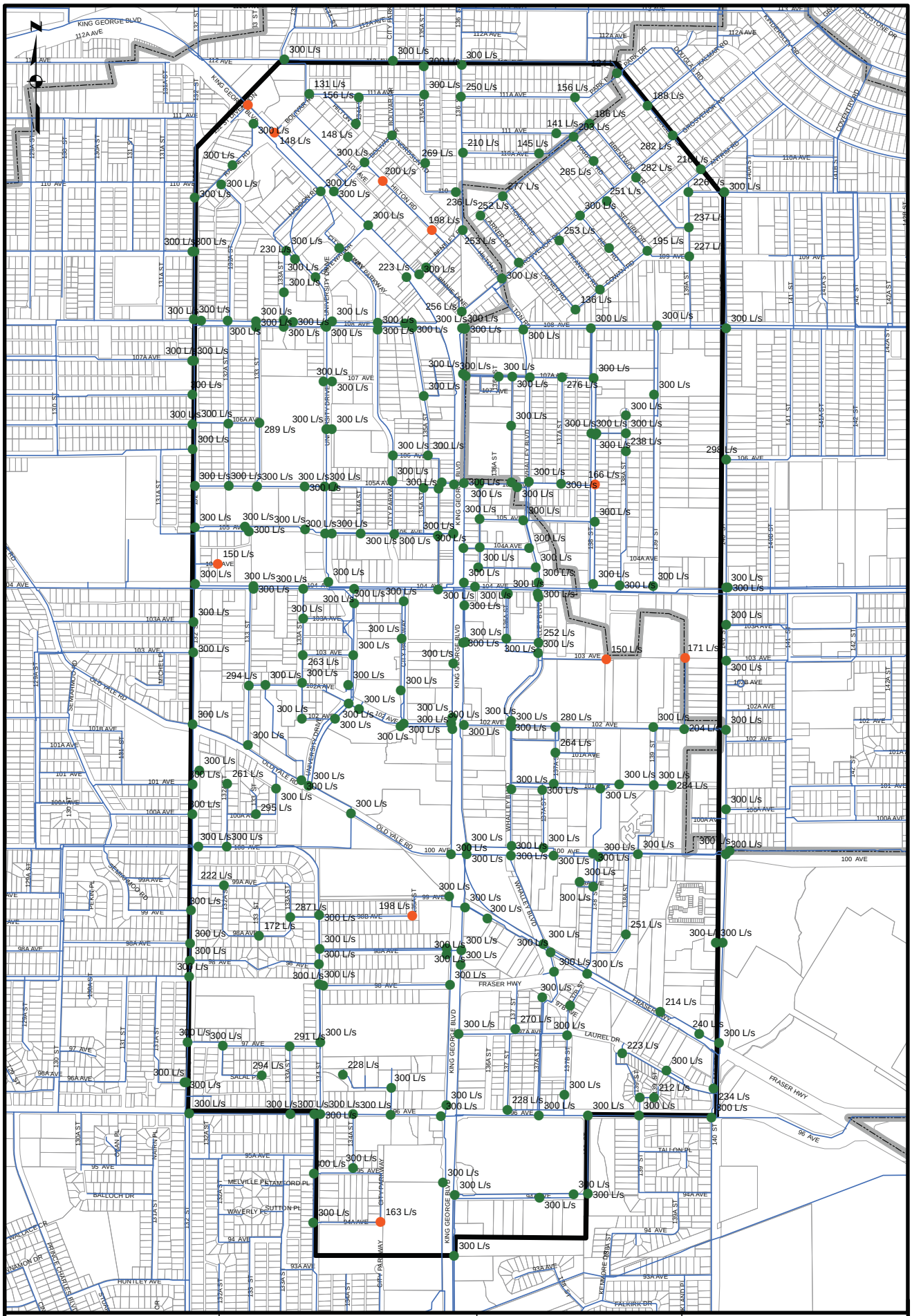
City Centre Boundary
Pressure Zone Boundaries

AECOM

200 100 0 200 Meters

2033 Horizon
PHD Pressure & Velocity
with Improvements

FIGURE 8.9



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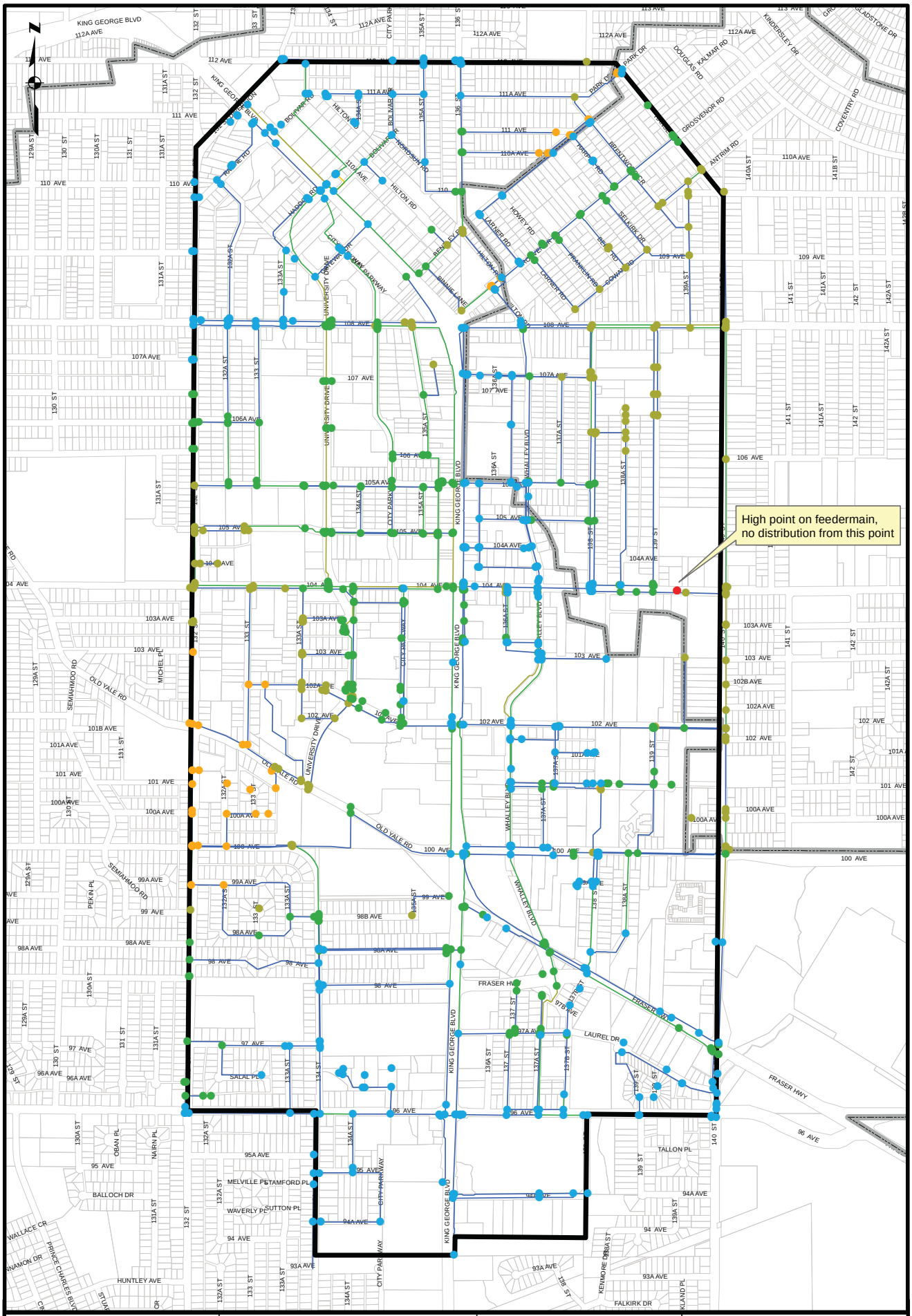
Legend

- Insufficient Fire Flow
- Insufficient Fire Flow - Requirements can be achieved if mains are upgraded to the minimum City Centre sizing of 250 mm
- Sufficient Fire Flow
- Watermains
- City Centre Boundary
- Pressure Zone Boundaries

200 100 0 200 Meters

2033 Horizon
MDD+FF
with Improvements

FIGURE 8.10



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Legend

Pressure (psi)	Velocity (m/s)
< 40	< 0.5
40 - 50	0.5 - 1.0
50 - 60	1.0 - 1.5
60 -70	1.5 - 2.0
> 70	> 2.0

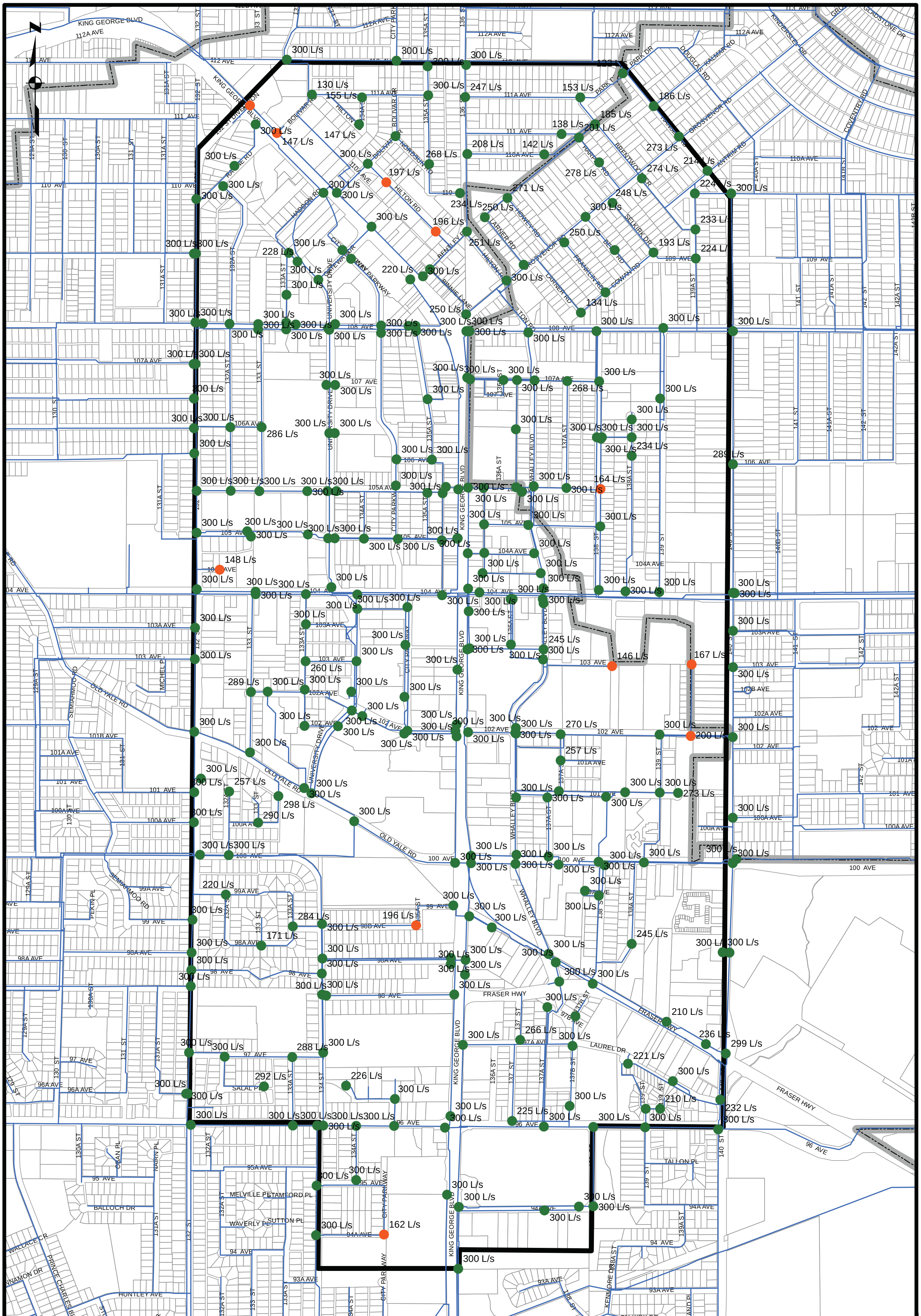
City Centre Boundary
Pressure Zone Boundaries

AECOM

200 100 0 200 Meters

2043 Horizon
PHD Pressure & Velocity
with Improvements

FIGURE 8.11



Legend

- Insufficient Fire Flow
- Insufficient Fire Flow - Requirements can be achieved if mains are upgraded to the minimum City Centre sizing of 250 mm
- Sufficient Fire Flow
- Watermains
- City Centre Boundary
- Pressure Zone Boundaries

200 100 0 200 Meters

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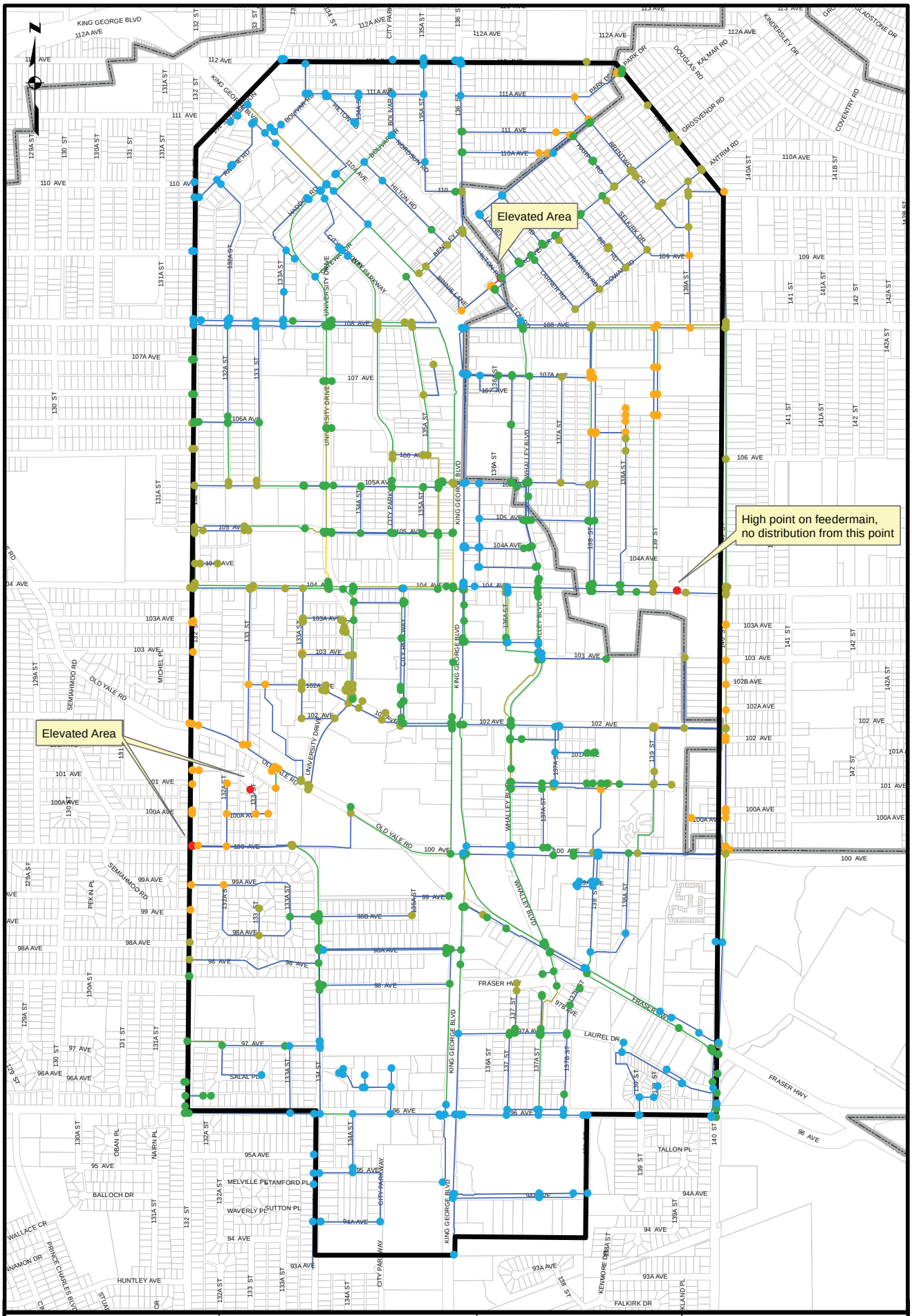
AECOM

2043 Horizon
MDD+FF
with Improvements

FIGURE 8.12



City Centre Plan 2013 Update
Utility Servicing Strategy

Project No.	Date
60278179	June 2014

Legend

Pressure (psi) / Velocity (m/s)

- < 40 / < 0.5
- 40 - 50 / 0.5 - 1.0
- 50 - 60 / 1.0 - 1.5
- 60 -70 / 1.5 - 2.0
- > 70 / > 2.0

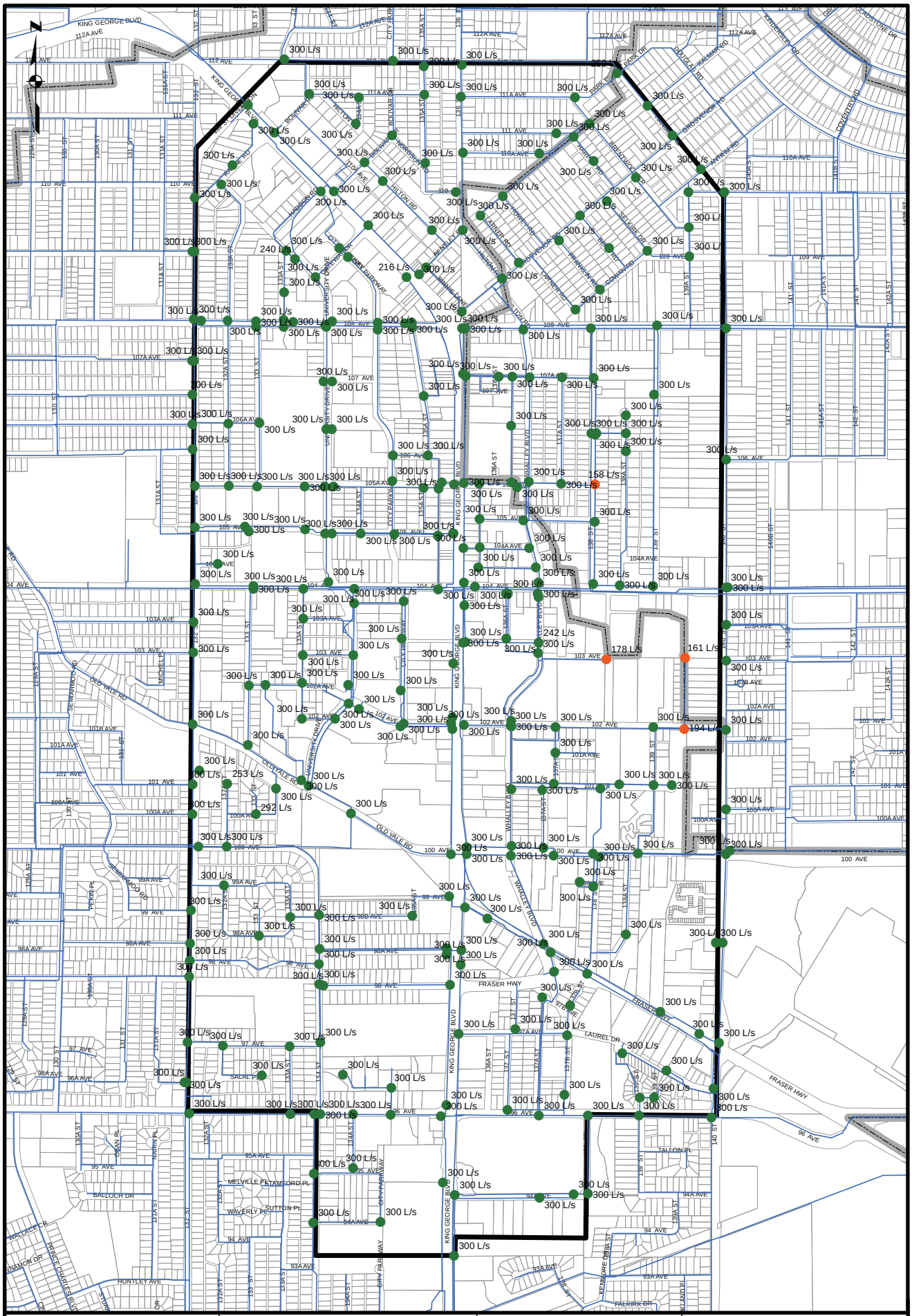
City Centre Boundary

Pressure Zone Boundaries

200 100 0 200 Meters

2083 Horizon PHD Pressure & Velocity with Improvements

FIGURE 8.13



City Centre Plan 2013 Update
Utility Servicing Strategy

Project No.	Date
60278179	August 2014

Legend

- Insufficient Fire Flow
- Insufficient Fire Flow - Requirements can be achieved if mains are upgraded to the minimum City Centre sizing of 250 mm
- Sufficient Fire Flow
- Watermains
- City Centre Boundary
- Pressure Zone Boundaries

AECOM

200 100 0 200 Meters

2083 Horizon
MDD+FF
with Improvements

FIGURE 8.14

APPENDIX B: WATER DETAILS

- ☐ Existing Water Equivalent Population
- ☐ 2023 Water Equivalent Population
- ☐ 2033 Water Equivalent Population
- ☐ 2043 Water Equivalent Population
- ☐ Build Out Water Equivalent Population
- ☐ Base Day Demand (BDD)
- ☐ Seasonal Demand and Max Day Demand (MDD)
- ☐ Peaking Factors (PF) and Peak Hour Demand (PHD)
- ☐ Fire Flow Demand (FF)
- ☐ Water Model and GIS Discrepancies
- ☐ Capacity Upgrades: Bulk Supply and Feedermains
- ☐ Existing Capacity Upgrades: Distribution and Major Grid Mains
- ☐ Build Out Capacity Upgrades: Distribution and Major Grid Mains
- ☐ DCC Eligible Upgrades

B1. Existing Water Equivalent Population

Residential
The existing residential population was provided by the City Planning Department and adjusted to include the addition of secondary suites (1.93 additional people per single family residence) to 38% of all existing single family homes, for a total population of 33,812.

Commercial
The existing commercial employment population was provided by the City Planning Department as 23,585.

Institutional
Equivalent institutional populations were generated by units and populations provided by the City, City School Board, and Fraser Health Authority. The per capita demand utilized in this study for the calculation of Base Demand is 320 litres/capita/day (L/c/d) and includes an allowance for leakage (estimated at approximately 10%). This unit rate was developed as part of the 2005 KWL *Grandview Pump Station Pre-Design Report* and was utilized in the 2007 KWL *North Surrey Pump Station Study*.

A unit base demand rate of 320 L/cap/day was used to convert the institutional units to equivalent populations, which is shown in ***Table 1***.

Table 1 Existing Water Institutional Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	500 beds	900 L/bed/d	1,406
Laurel Place Retirement Home	191 beds	650 L/bed/d	388
Forsyth Road Elementary School	271 students	45 L/student/d	38
AHP Mathew Elementary School	426 students	45 L/student/d	60
Queen Elizabeth Secondary School	1435 students	90 L/student/d	404
Cherington Place Retirement Home	75 beds	650 L/bed/d	152
Parks (irrigation)	27.8 ha	3,520 l/ha/d	306
		Total =	**2,754**

B2. 2023 Water Equivalent Population

Residential

The 2023 residential population was provided by the City and adjusted to include the addition of secondary suites (1.93 additional people per single family residence) to 100% of all single family homes, for a total population of 52,442.

Commercial

Commercial employment population was provided by the City Planning Department to be 27,670 for 2023. The commercial employment populations developed by the City Planning Department were compared with a generated equivalent commercial population based on commercial floor space as recommended by City Water Division. The greater population was then taken to be the higher water demand projection.

The commercial floor space in GIS was converted to an equivalent population based on 200 person population equivalent per 10,000 m^2 (1pp/50 m^2) of floor space which includes an allowance for visitors as directed by City staff. An equivalent commercial population of 33,064 was calculated for 2023. This value was utilized to develop water demand projections.

Institutional

Equivalent institutional populations were generated by units and populations provided by the City, City School Board, and Fraser Health Authority. Similar to the method used for existing, a unit base demand rate of 320 L/cap/day was used to convert the institutional units to equivalent populations, which is shown in ***Table 2***.

Table 2 2023 Water Institutional Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	650 beds	900 L/bed/d	1,828
Laurel Place Retirement Home	191 beds	650 L/bed/d	388
Forsyth Road Elementary School	350 students	45 L/student/d	49
AHP Mathew Elementary School	550 students	45 L/student/d	77
Queen Elizabeth Secondary School	1854 students	90 L/student/d	521
Cherington Place Retirement Home	75 beds	650 L/bed/d	152
Parks (irrigation)	27.8 ha	3,520 l/ha/d	306
		Total =	**3,322**

B3. 2033 Water Equivalent Population

Residential

The 2033 residential population was provided by the City and adjusted to include the addition of secondary suites (1.93 additional people per single family residence) to 100% of all single family homes, for a total population of 71,858.

Commercial

The methodology described in the 2023 horizon was used to generate equivalent commercial populations for 2033. A Commercial employment population was provided by the City Planning Department as 32,332 for 2033.

The commercial floor space in GIS was converted to an equivalent population based on 200 person population equivalent per 10,000 m^2 (1pp/50 m^2) of floor space which includes an allowance for visitors as directed by City staff. An equivalent commercial population of 42,543 was calculated for 2033. This value was utilized to develop water demand projections.

Institutional

Equivalent institutional populations were generated by units and populations provided by the City, City School Board, and Fraser Health Authority. Similar to the method used for existing and 2023, a unit base demand rate of 320 L/cap/day was used to convert the institutional units to equivalent populations, which is shown in ***Table 3***.

Table 3 2033 Water Institutional Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	800 beds	900 L/bed/d	2,250
Laurel Place Retirement Home	191 beds	650 L/bed/d	388
Forsyth Road Elementary School	437 students	45 L/student/d	61
AHP Mathew Elementary School	686 students	45 L/student/d	96
Queen Elizabeth Secondary School	2,312 students	90 L/student/d	650
Cherington Place Retirement Home	75 beds	650 L/bed/d	152
Parks (irrigation)	27.8 ha	3,520 l/ha/d	306
		Total =	**3,904**

B4. 2043 Water Equivalent Population

Residential

The 2043 residential population of was provided by the City and adjusted to include the addition of secondary suites (1.93 additional people per single family residence) to 100% of all single family homes, for a total population of 92,106.

Commercial

The methodology described in the 2023 horizon was used to generate equivalent commercial populations for 2043. A Commercial employment population was provided by the City Planning Department as 37,742 for 2043.

The commercial floor space in GIS was converted to an equivalent population based on 200 person population equivalent per 10,000 m^2 (1pp/50 m^2) of floor space which includes an allowance for visitors as directed by City staff. An equivalent commercial population of 52,022 was calculated for 2043. This value was utilized to develop water demand projections.

Institutional

Equivalent institutional populations were generated by units and populations provided by the City, City School Board, and Fraser Health Authority. Similar to the method used for existing, 2023, and 2033 a unit base demand rate of 320 L/cap/day was used to convert the institutional units to equivalent populations, which is shown in ***Table 4***.

Table 4 2043 Water Institutional Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	800 beds	900 L/bed/d	2,250
Laurel Place Retirement Home	191 beds	650 L/bed/d	388
Forsyth Road Elementary School	488 students	45 L/student/d	69
AHP Mathew Elementary School	766 students	45 L/student/d	108
Queen Elizabeth Secondary School	2,581 students	90 L/student/d	726
Cherington Place Retirement Home	75 beds	650 L/bed/d	152
Parks (irrigation)	27.8 ha	3,520 l/ha/d	306
		Total =	**3,998**

B5. Build Out Water Equivalent Population

Residential

The Build Out residential population was provided by the City and adjusted to include the addition of secondary suites (1.93 additional people per single family residence) to 100% of all single family homes, for a total population of 160,599.

Commercial

The methodology described in the 2023 horizon was used to generate equivalent commercial populations for 2083. A Commercial employment population was provided by the City Planning Department as 56,572 for 2083.

The commercial floor space in GIS was converted to an equivalent population based on 200 person population equivalent per 10,000 m^2 (1pp/50 m^2) of floor space which includes an allowance for visitors as directed by City staff. This generated a commercial population of 89,937 at full build out. This value was utilized to develop water demand projections.

Institutional

Equivalent institutional populations were generated by units and populations provided by the City, City School Board, and Fraser Health Authority. Similar to the method used for existing, 2023, 2033, and 2043 a unit base demand rate of 320 L/cap/day was used to convert the institutional units to equivalent populations, which is shown in ***Table 5***.

Table 5 2083 (Build Out) Water Institutional Population Equivalent

Facility	Units	Flow Per Unit	Institutional Equivalent Population
Surrey Memorial Hospital	800 beds	900 L/bed/d	2,250
Laurel Place Retirement Home	191 beds	650 L/bed/d	388
Forsyth Road Elementary School	813 students	45 L/student/d	114
AHP Mathew Elementary School	1,278 students	45 L/student/d	180
Queen Elizabeth Secondary School	4,305 students	90 L/student/d	1,211
Cherington Place Retirement Home	75 beds	650 L/bed/d	152
Parks (irrigation)	27.8 ha	3,520 l/ha/d	306
		Total =	**4,601**

B6. Base Day Demand (BDD)

The BDD for all horizons are developed through multiplying the per capita BDD unit rate (320 l/c/d) by the residential, commercial, and institutional equivalent populations.

B7. Seasonal Demand and Max Day Demand (MDD)

The seasonal demand is based on the unit rate of 0.39 l/s/ha applied to the area for each corresponding land use as developed in the *2004 Water Model: Model Development Study* report.

The existing MDD that was developed for the *North Surrey Pump Station Study* was utilized as the existing scenario in this study. 2023 MDD was generated by interpolating between existing and 2033 MDD. 2033, 2043, and build out MDD was developed by combining the BDD with seasonal water demand. The total seasonal water demand is considered to not change from beyond the 2033 horizon.

However, the distribution of seasonal demand between residential and institutional/commercial (IC) sectors does change as City Centre shifts toward high density mixed use at build out. In residential/commercial mixed use areas, we have assigned the seasonal water demand to the residential component.

At Build Out, the Commercial water use sector has no seasonal water demand as all commercial development has a residential component that includes seasonal water demand in this scenario.

B8. Peaking Factors (PF) and Peak Hour Demand (PHD)

PHD was developed by combining the estimated peak BDD and peak seasonal water demand. Peaking factors provided with the North Surrey Hydraulic Model were utilized only for the 2013 existing horizon. All future horizons utilize peaking factors developed from 2007 meter data from the Clayton area of Surrey.

Peaking factors were developed for both the BDD and seasonal demands to better represent the difference between indoor water use and irrigation peaks. As City Centre population density increases, single family residential areas will be replaced with mid and high rise residential. Irrigation demands will be relatively independent of population for high density neighbourhoods and maintaining separate residential (Base) and irrigation (seasonal) demands will provide a more accurate estimate of future PHD.

Base demand PHD peaking factors were further divided into residential and commercial water use sectors due to the significant differences in water use between these sectors. The residential base demand peaking factor was estimated to be 1.7 using November 2007 bulk meter data from Clayton as a basis. For commercial and institutional land uses, the BDD peaking factor was estimated to be 1.2 based on previous studies for the Township of Langley and City of New Westminster.

A separate peaking factor of 2.1 was estimated for the seasonal demand based on August 2007 bulk meter data from Clayton. The seasonal demand peaks were assumed to be similar in residential, commercial, and institutional land uses.

B9. Fire Flow Demand (FF)

Fire flow demands are based on land use zoning. The City of Surrey Design Criteria Manual (2004) includes 52 separate zonings with five different fire flow values. For modelling purposes, the fire flow demands in the City of Surrey Engineering Department Design Criteria Manual (2004) were simplified to include three basic land uses in City Centre with three different fire flow values:

- Single Family Residential = 60 L/s;
- Multi-Family Residential = 200 L/s; and
- Commercial and Institutional = 200 L/s.

This simplification will overestimate fire flow required for duplex residential, neighbourhood commercial and self-service gas station properties. However, there are few existing properties impacted by this simplification and future City Centre is largely dense commercial and residential development with higher fire flow requirements. Therefore, the impact of this simplification is marginal and does not impact the medium and long term infrastructure requirements in City Centre.

B10. Water Model and GIS Discrepancies

Water Model Discrepancies with COSMOS			
	Description	Old Pipe IDs	New Pipe IDs
1	Connected 450/300mm main on Haddon Rd to 150mm main on King George Blvd.	106942	P-19040
	- additional affected pipes	107020	P-19038
			P-19039
2	Replaced 150mm main on King George Blvd. north of Haddon Rd with 300mm main	107116	P-19051
	- additional affected pipes	107006	P-19036
3	Added 300mm connection across Haddon Rd at 10977 University Drive		P-19037
	- additional affected pipes	106960	P-19033
			P-19034
4	Connected 300mm main on King George Blvd. with 150mm main on 100 Avenue	105728	P-19027
	- additional affected pipes		P-19028
5	Added 300mm connection on 137B St across Fraser Hwy to 96 Ave		P-19021
			P-19022

B11. Existing Scenario - Distribution & Major Grid Main Capacity Upgrades

Location	Pipe ID	Ex Dia (mm)	Ex Material	Year Installed	Length (m)	Prop. Dia (mm)	Unit Cost	Cost	NPV (3%)
104 Ave b/w lane and east side KG Blvd. - New Connection	P-19086	-	-	-	37	350	$1,200	$44,400	$44,400
King George Blvd (east side) south of 104 Ave	105465	200	DI	2002	8	300	$1,100	$8,800	$8,800
	P-18982	150	DI	1964	64	300	$1,100	$70,400	$70,400
102 Ave bw 139 St and 137A St	105611	150	AC	1970	289	250	$1,050	$303,450	$303,450
	105612	150	AC	1970	12	250	$1,050	$12,600	$12,600
King George Blvd. at 99 Ave - New Connection	FUT-19054	-	-	-	80	250	$1,050	$84,000	$84,000
100A Ave b/w 132A St and 133 St	105893	150	AC	1959	39	250	$1,050	$40,950	$40,950
	105894	150	AC	1959	89	250	$1,050	$93,450	$93,450
100A Ave to Old Yale Rd - New Connection	FUT-19052	-	-	-	102	250	$1,050	$107,100	$107,100
132A St north of 100 Ave	105895	150	AC	1959	100	250	$1,050	$105,000	$105,000
	105896	150	AC	1959	94	250	$1,050	$98,700	$98,700
Binnie Lane b/w Bentley Rd and Grosvenor Rd	107027	150	DI	1975	182	250	$1,050	$191,100	$191,100
Bentley Rd b/w King George Blvd. and Binnie Rd	107215	150	CI	1964	31	250	$1,050	$32,550	$32,550
North side KG Blvd. b/w Bentley Rd and Gateway Dr	P-19017	150	DI	1990	221	250	$1,050	$232,050	$232,050
King George Blvd. b/w 96 Ave and 99 Ave	106035	200	DI	1963	249	300	$1,100	$273,900	$273,900
	105764	200	DI	1963	214	300	$1,100	$235,400	$235,400
Harper Rd b/w Bentley Rd and Grosvenor Rd	106780	50	PV	1992	2	250	$1,050	$2,100	$2,100
King George Blvd. north of 108 Ave	106951	150	CI	1964	245	250	$1,050	$257,250	$257,250
102 Ave west of University Drive	105681	150	DI	1973	102	250	$1,050	$107,100	$107,100
137B St b/w 97A Ave and 97B Ave	105524	150	DI	1980	86	250	$1,050	$90,300	$90,300
137A St b/w 101A Ave and 102 Ave	105590	150	AC	1962	79	250	$1,050	$82,950	$82,950
139A St north of 102 Ave	105605	150	DI	1979	218	250	$1,050	$228,900	$228,900
137A St b/w 97A Ave and 97B Ave	105638	150	DI	1971	14	250	$1,050	$14,700	$14,700
	105639	150	DI	1971	99	250	$1,050	$103,950	$103,950
97A Ave b/w 137A St and 137B St	105630	150	DI	1971	81	250	$1,050	$85,050	$85,050
Haddon Rd b/w KG Hwy and 133A St	P-19036	150	AC	1963	223	250	$1,050	$234,150	$234,150
Sub-Total								**$3,140,300**	

Build Out Scenario - Distribution & Major Grid Main Capacity Upgrades

Location	Pipe ID	Ex Dia (mm)	Ex Material	Year Installed	Length (m)	Prop. Dia (mm)	Unit Cost	Cost	NPV (3%)
Old Yale Rd west of University Drive	105768	150	DI	1972	81	450	$1,400	$113,400	$14,322
	105912	150	DI	1976	13	450	$1,400	$18,200	$2,299
	105682	150	DI	2001	7	250	$1,050	$7,350	$928
	105683	150	DI	1972	24	250	$1,050	$25,200	$3,183
137A St b/w 101 Ave and 101A Ave	105589	150	AC	1962	95	250	$1,050	$99,750	$12,598
Bentley Rd b/w Binnie Lane and Hilton Rd.	107018	150	CI	1964	64	250	$1,050	$67,200	$8,487
	107216	150	CI	1964	93	250	$1,050	$97,650	$12,333
97A Ave b/w 137 St and 137A St	105632	150	DI	1971	76	250	$1,050	$79,800	$10,079
	105631	150	DI	1971	3	250	$1,050	$3,150	$398
University Drive at 104 Ave	107104	350	DI	1991	9	450	$1,400	$12,600	$1,591
	107105	350	DI	1991	6	450	$1,400	$8,400	$1,061
University Drive at Old Yale Rd - New Connection	P-19070	-	-	-	20	450	$1,400	$28,000	$3,536
King George Hwy b/w Haddon Rd and Gateway Dr.	P-19016	150	DI	1987	148	250	$1,050	$155,400	$19,627
	P-19039	150	CI	2002	30	250	$1,050	$31,500	$3,978
96 Ave b/w 137A St and 137B St.						*			
	P-19019	150	DI	1964	99	300	$1,100	$108,900	$13,754
Sub-total								**$856,500**	

Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

Note for Table B11 and B12 - Only distribution mains that require capacity improvements prior to their aging infrastructure replacement date are included in the capacity improvement program. Existing distribution mains that reach the end of their useful life are replaced by 250mm diameter watermains as part of the City's ageing infrastructure replacement program.

B12. DCC Eligible - Major Grid Mains Capacity Upgrades

Ten Year Servicing Plan (2014 – 2023) Project ID	Location	Priority	Pipe ID	Ex Dia. (mm)	Ex Material	Year Installed	Length (m)	Prop. Dia. (mm)	Unit Cost	Cost	NPV (3%)
Existing Scenario Upgrades											
-	104 Ave b/w lane and east side KG Blvd. - New Connection	N	P-19086	-	-	-	37	350	$1,200	$44,400	$44,400
13799	King George Blvd. (east side) south of 104 Ave	U/N	105465	200	DI	2002	8	300	$50	$400	$400
			P-18982	150	DI	1964	64	300	$50	$3,200	$3,200
7792	King George Blvd. b/w 96 Ave and 99 Ave	U/N	106035	200	DI	1963	249	300	$50	$12,450	$12,450
			105764	200	DI	1963	214	300	$50	$10,700	$10,700
Existing Scenario Sub-Total							572			$71,150	$71,150
Build Out Scenario Upgrades											
-	Old Yale Rd west of University Drive	N	105768	150	DI	1972	81	450	$1,400	$113,400	$14,322
		N	105912	150	DI	1976	13	450	$1,400	$18,200	$2,299
11510	University Drive at 104 Ave	N	107104	350	DI	1991	9	450	$1,400	$12,600	$1,591
		N	107105	350	DI	1991	6	450	$1,400	$8,400	$1,061
-	University Drive at Old Yale Rd - New Connection	N	P-19070	-	-	-	20	450	$1,400	$28,000	$3,536
-	96 Ave b/w 137A St and 137B St										
		U/N	P-19019	150	DI	1964	99	300	$50	$4,950	$625
Build Out Scenario Sub-Total							228			$185,550	$23,435
Existing & Build Out Total							**800**			**$256,700**	**$94,585**

Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

U = upsizing contribution
N = NCP dependent

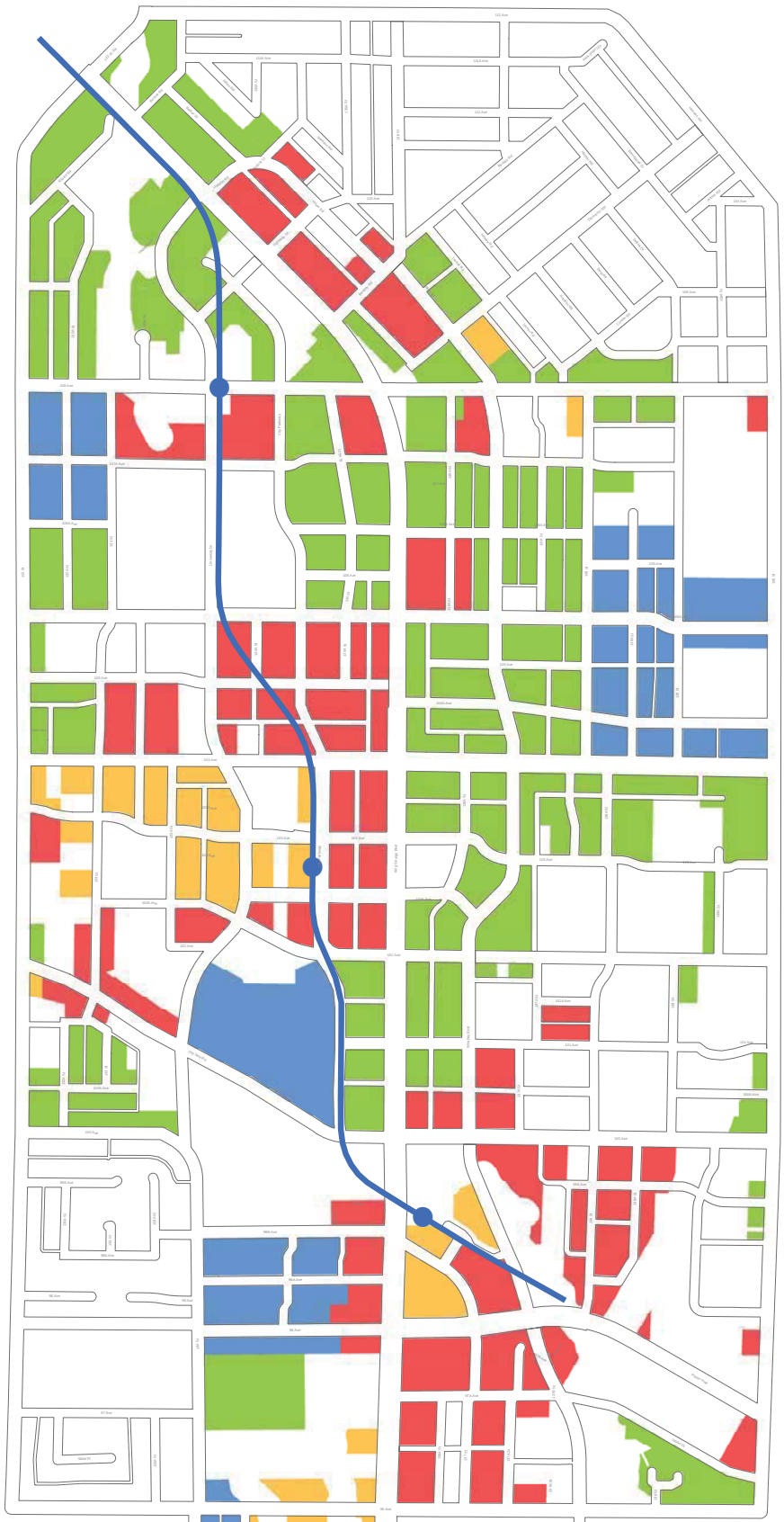
B13. DCC Eligible - Bulk Supply and Feedermain Capacity Upgrades

Pump Stations	# of New Pumps		Upgrade Year	Unit Cost ($)	Cost	NPV (3%)	Ten Year Servicing Plan (2014-2023) Project ID
Add 1 – 600 L/s pump to Whalley Main Pump Station*	1		2083	750,000	$ 750,000	$ 97,565	-
Add 1 – 250 L/s pump to Whalley Booster Pump Station*	1		2083	500,000	$ 500,000	$ 65,043	-
				Pump Stations Subtotal	**$ 1,250,000**	**$ 162,608**	
Feedermains	**Length (m)**	**Dia. (mm)**	**Upgrade Year**	**Unit Cost ($/m)**	**Cost**	**NPV (3%)**	
104A Ave. b/w Whalley PS and 144 St.	525	900	2023	3,000	$ 1,575,000	$ 1,207,106	13901
144 St. b/w 104A Ave. and 104 Ave.	135	900	2023	3,000	$ 405,000	$ 310,399	13901
104 Ave. b/w 144 St. and King George Blvd.	1,652	900	2023	3,000	$ 4,956,000	$ 3,798,361	11510
104 Ave. b/w King George Blvd. and University Drive	365	750	2033	2,400	$ 876,000	$ 499,571	-
	2,677			**Feedermain Subtotal**	**$ 7,812,000**	**$ 5,815,437**	
				Bulk Supply and Feedermain Total	**$ 9,062,000**	**$ 5,978,045**	

No land acquisition costs required. A spare pump bay is available at each pump station.
Cost estimates calculated from City of Surrey construction unit rates for NCPs and include project contingency.

B15. City Centre Projected Growth Areas for Development Staging Scenarios

City Centre Projected Areas



N

1:4,500

Legend

- City Centre Skytrain
- City Centre Skytrain Stations

Projected Areas

- A
- B
- C
- D

0 0.1250.25 0.5 0.75 1 Kilometers

		2013			2023			2033			2043			2083		
	# of SF Parcels (2007)	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop	% Redeveloped	% SS	SS Pop
Polygon A	72	0%	38%	53	65%	100%	49	21%	100%	110	9%	100%	126	5%	100%	132
Polygon B	280	0%	38%	205	14%	100%	465	22%	100%	422	23%	100%	416	41%	100%	319
Polygon C	452	0%	38%	331	5%	100%	829	13%	100%	759	15%	100%	742	67%	100%	288
Polygon D	286	0%	38%	210	2%	100%	541	2%	100%	541	6%	100%	519	90%	100%	55
Existing	901	0%	38%	661	0%	100%	1,739	0%	100%	1,739	0%	100%	1,739	0%	100%	1,739
Total	1,991			1,460			3,622			3,570			3,542			2,533

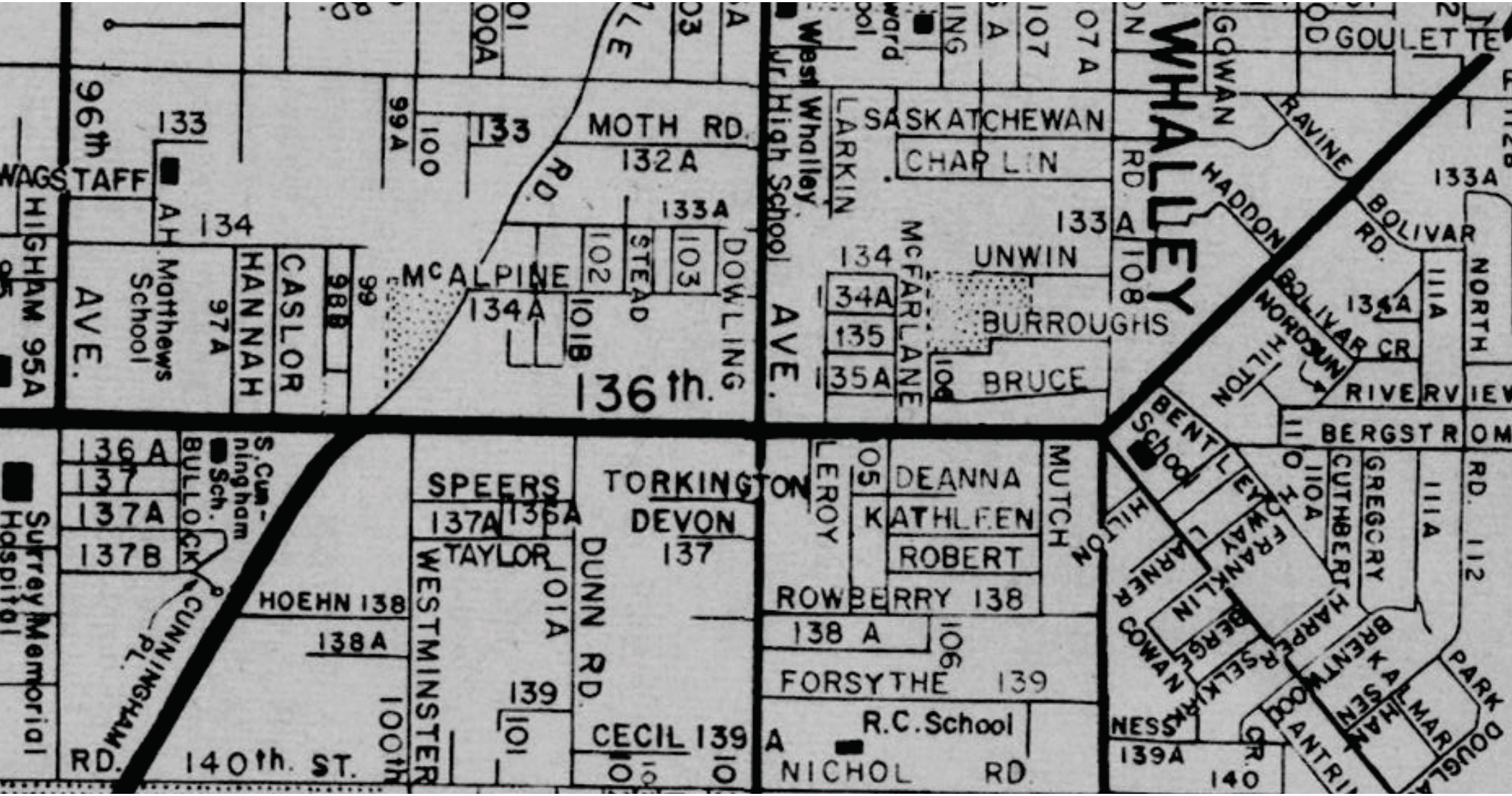
	2013	**2023**	**2033**	**2043**	**2083**
General Population	32,352	48,820	68,288	88,564	158,066
Secondary Suite Population	1,460	3,622	3,570	3,542	2,533
Total Population	33,812	52,442	71,858	92,106	160,599

A-2.4

Surrey City Centre Heritage Review

July 2011

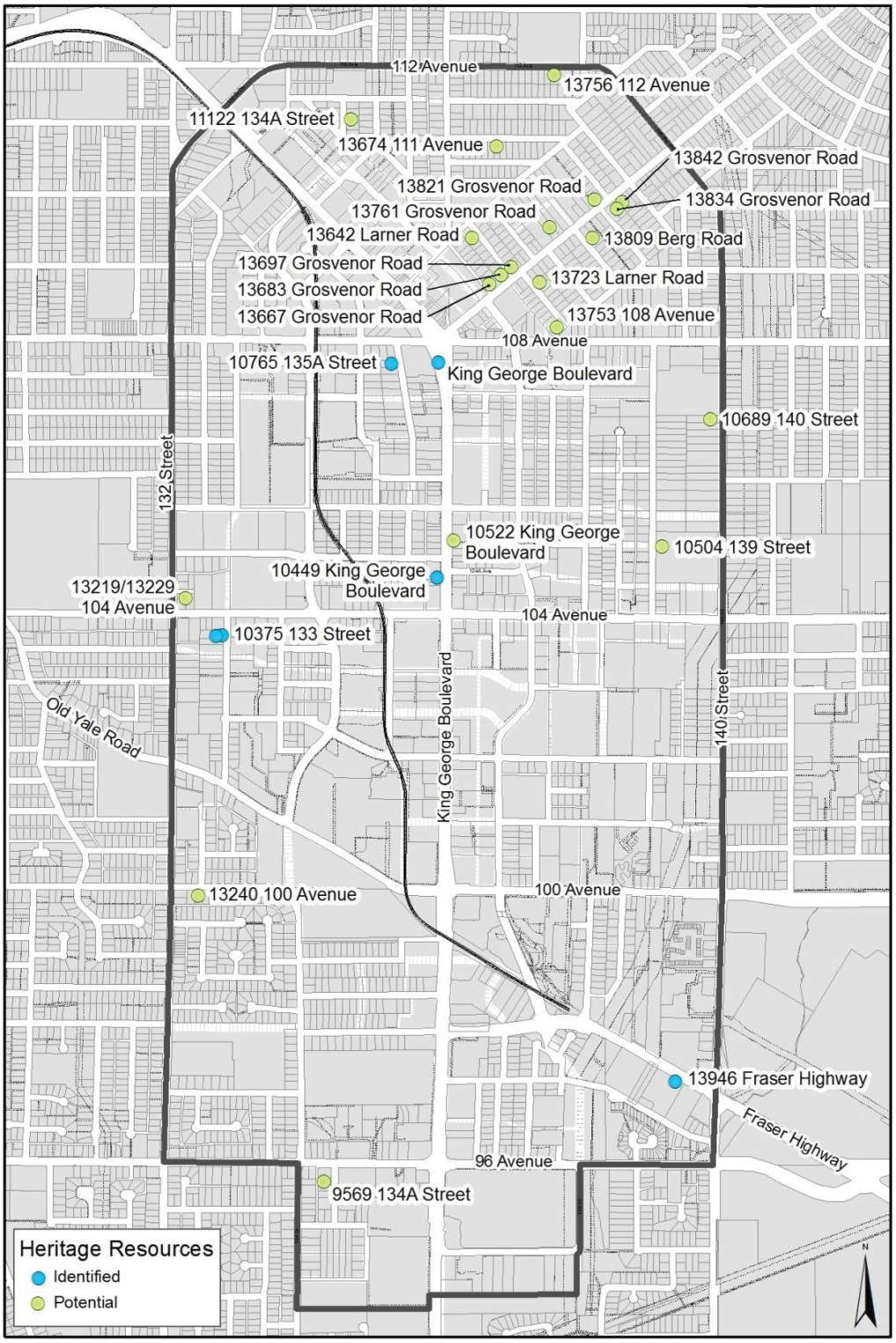
Surrey City Centre:
Heritage Review



Contents

A. Study Area

The City Centre Plan Update study area includes approximately 388 hectares (960 acres) of land (see map below). It is generally rectangular in shape, with King George Boulevard running through its centre, and is generally bounded by 112 Avenue to the north, 96 Avenue to the south, 132 Street to the west and 140 Street to the east.



B. Historical Context

1. Kwantlen First Nation

The Kwantlen First Nation came to the Surrey-New Westminster area many hundreds of years ago. By three hundred years ago they were a powerful nation with a large community called Squaimetl (sx_woyimehl) where New Westminster is now. A smaller fishing camp, Kikait (Qiqá:yt), was on the Surrey side of the river where the south ends of the Pattullo and Skytrain bridges touch land.

The North Surrey area had many riches; deer, elk and game birds were abundant. The Fraser and other streams yielded fresh water fish and the all important salmon during spawning seasons. Salal berries, cranberries and huckleberries were gathered from the bogs and forests. The Kwantlen dug the roots of cinquefoil and wild clover to steam and eat. The area also provided material for tools, baskets and the many other items used by the First Nations people.

The Kwantlen Park area, immediately west of Surrey City Centre, was a place of refuge for the Kwantlen nation. The Southern Kwakiutl or "Laich-kwil-tach" people from the Campbell River region regularly raided the Kwantlen nation for slaves and goods. The park area was a close, convenient place to retreat to. It had good water in a small lake and stream that ran through the park. There were many open pockets in the forest where one could set up camp without being found. The high ground overlooking the river also made it easy to watch for any approaching raiders.

In 1782, a great calamity struck the Kwantlen nation, which by this time numbered thousands. A smallpox epidemic, coupled with various other diseases, swept north through the west coast tribes. Within 15 years, the Kwantlen nation was reduced to fewer than 200 survivors.

Tree burial was common among the Kwantlen nation. The dead would be wrapped in blankets and deposited in a large box capable of holding the remains of several persons. Large boxes were left on the ground, but smaller boxes would be placed in a tree. The Royal Engineers and the first white settlers encountered a large number of skeletons in burial boxes hanging in the trees. It is believed that the Royal Engineers persuaded the Kwantlen to take down and rebury their dead in a burial ground. Father Dereau laid them to rest in two or three graves marked with one large wooden cross. This site, located in present-day Kwantlen Park, was used as a cemetery for the Kwantlen nation until the 1920s.

In 1871, the Kwantlen nation was deeded a 40 acre (16 hectare) site on Old Yale Road as part of their treaty lands (Kwantlen Indian Reserve #7). In 1954, the City of Surrey purchased the 40 acre reserve from the Kwantlen nation for $40,000. By 1956, K.B. Woodward Elementary School was built on the site. The opening of West Whalley Junior Secondary followed in 1957. In 1959, Surrey decided to use the remaining portion of the former Kwantlen Reserve to create a park for Whalley. Today, this park is known as Royal Kwantlen Park.

Sources:
http://members.shaw.ca/jack_brown/kwantlen.html
http://www.kwantlenpark.ca/in/history01.htm

2. Settlement & Development

Settlers began pre-empting land in the vicinity of present-day Surrey City Centre as early as the 1880s (earlier along the river).

In 1908, Surrey Council requested a grant to build a road from the old Fraser Bridge in South Westminster, southward up Peterson Hill to present-day 108th Avenue. The new road cut off a portion of the Old Yale Road known as "Snake Hill" because of its steep, dangerous curves. This route later became part of the King George Boulevard through Whalley.

Whalley's Corner: Where it all began...

In 1925, Arthur Whalley and family moved from a farm in Cloverdale to the area that was to perpetuate the family name. They purchased a three-acre triangle of land at the future intersection of Ferguson Road (108 Avenue), Grosvenor Road and the future King George Boulevard. They had the land cleared and spent the first winter in tents on the site, where they built a service station, which included a small general store, soft drink stand, and tourist cabins. The original family house (since moved) was built behind the station.

The intersecting roads did not exist at that time but this was the first gas station out of New Westminster, and the area became known as Whalley's Corner. It is probably no coincidence that a service station should be built here at this time. In 1923, the Pacific Highway (passing through future Whalley) had been paved all the way to the U.S. Border. With the proliferation of the automobile already evident, Arthur Whalley anticipated the strip development that would begin to appear along major roads by the 1940s.

City of Surrey Archives

The opening of the Pattullo Bridge in November 1937 provided the impetus for more rapid settlement of North Surrey. When the tolls were removed from the Pattullo Bridge in 1952, the Whalley area saw a major commercial and residential building boom.

Binnie Block: The expansion of commercial development

The Whalley family's neighbours included the Binnie family. Tom Binnie established the first real estate office in Whalley. In 1947, his "Binnie Block" was one of the first commercial buildings along the highway, with the Cameo Theatre and a branch of the Bank of Nova Scotia. The same year also marked the official opening of a post office at Whalley's Corner.

The bulk of the initial commercial development occurred as ribbon development along the highway north and south of Whalley's Corner. The late 1950s saw the Dell Shopping Center open as the first of the centralized one-stop shopping centers. 1972 saw the opening of Surrey Place Mall and the growing predominance of that district as Surrey's predominant shopping area.

After the first Board of Trade was organized, a contest was started to rename Whalley's Corner. Among the names suggested was "Binnieville", in honour of Tom Binnie, who had contributed to fostering Whalley's growth as a commercial centre. Ultimately public support favoured retention of the "Whalley" designation, without the "corner" which was thought to be too unsophisticated for a district with aspirations to being a modern commercial centre. The new name was officially adopted in 1948.

Source:
http://www.surrey.ca/culture-recreation/2409.aspx

Bolivar Heights

Bolivar Heights takes its name from the Bolivar family who arrived in Nova Scotia from Germany in 1751 and settled in Lunenberg, which had a growing German community. Like many Canadians, Dennis Bolivar was lured from the east coast of Canada to the west coast by the promise of gold. He passed through Vancouver on his way to the Yukon and then returned to settle in Vancouver, where he began his family. His son Haddon (1892-1976) was the Bolivar who developed the Bolivar Heights neighbourhood.

Haddon was married to his wife Laura for 60 years and they had seven children together: Merle, Bernice, Geraldine, Audrey, Dean, Myrna, and Earl. In 1913 Haddon and his father began a chick hatchery on Latimer Road. They supplied chicks to the poultry farmers in the Fraser Valley. The original barn is still standing and in good condition.

The Depression affected Haddon Bolivar's business as it did so many others'. After his business closed, Haddon moved to North Surrey in 1933 and restarted his chick hatchery at Bolivar Road and King George Highway. By this time, Haddon was also the President of the BC Hatchery Association. The barn and

hatchery were across the street from their large 3-storey home. The hatchery was quite a presence in the 40's and 50's as people drove down the King George Highway. It had a neon sign with fighting roosters on either side.

During this time, Haddon took an opportunity to buy property northeast of his previous location. This was the beginning of clearing land for residential development in what is now known as Bolivar Heights. Haddon believed in giving back to his community. He cleared the field for the Whalley Athletic Park and helped provide the fences and bleachers. Along with Gord Wilson and Tom Binnie, he was instrumental in beginning the Whalley Athletic Association. They formed the original men's ball team, the Whalley Chiefs. Eventually they founded two teams and provided bursaries for postsecondary education.

Haddon and Laura Bolivar had a dream of a local hospital. When they moved out of their large home they used the home for Florence Nightingale Hospital. The home was moved just east of its first location and in 1957 the 50-bed hospital was opened.

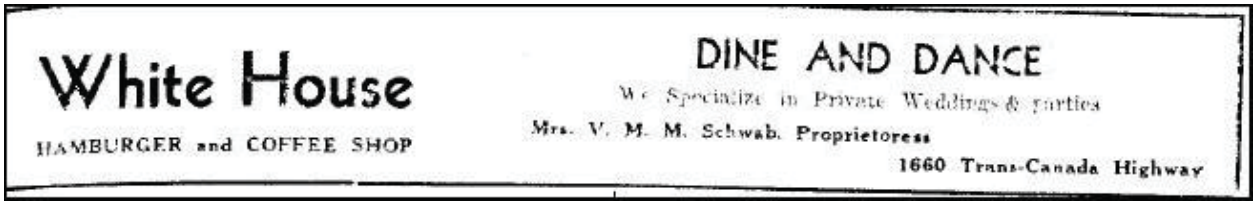
Laura Bolivar was active in the Catholic Women's League and in the Surrey Memorial Hospital Auxiliary. Dean Bolivar was active with the Kinsmen throughout the 1950s and his sister ran Merle's Salon from 1946 to 1952. Dean's son Rodney owned the Hockey Shop at 135th and 104th Avenue.

Source:
http://downtownsurreybia.com/wp-content/uploads/2010/08/NewView_June2008_Issue_27.pdf

The Junction

The intersection of Westminster Road (now 100th Avenue), the Trans-Canada Highway (now Fraser Highway), and King George Highway (now King George Boulevard) was known for many years as "The Junction." This well-known intersection helped define the boundaries of Whalley. In fact, when asked where Whalley begins and ends, many locals will still tell you that Whalley spans from Peterson Hill to the Junction.

The Junction was home to a variety of businesses including the "White House", a popular restaurant, bar, and dancehall. In the 1940-1960s, Surrey had a quite a few "Supper Clubs" – restaurants that turned into dance halls. The White House was one of these.



City of Surrey Archives

C. Historic Street Names

1. East-West Roads in Surrey City Centre

Avenue	As shown on 1938 map	As shown on 1957 map
96th Ave	Townline Road	
97th Ave		Hume Road
97A Ave		Bullock Road
98th Ave		Hannah Road
98A Ave		Caslor Road
100th Ave	Westminster Road	
100A Ave		Binnie Road
102A Ave	Dunn Road (102 in City Centre? TBC)	
102B Ave		Stead Road
103A Ave		Dowling Road
104th Ave	Hjorth Road	
104A Ave		Leroy Road
105th Ave		Larkin Road
105A Ave		McFarlane Road
106th Ave	Darling Road (west of 132, east of 132 TBC)	
107A Ave		Mutch Road
108th Ave	Ferguson Road	
109th Ave		Gowan Road (west of 132, east of 132 TBC)
110th Ave		Brentwood Drive
110A Ave		Cuthbert Road
111th Ave		Gregory Road
112th Ave	North Road	

- **96th Avenue: Townline Road** - In 1859, the slash line for the survey for the north side of the township became Township Road. Townships are 6 miles square. This is the line 12 miles from the Canada/USA border and marked the northern line of the second township. Around the turn of the century Surrey Council changed the name of Township Road to Townline Road.

- **Yale Road, Fraser Highway (1A)** - This was an all-weather road built from Brownsville east through the Fraser Valley to Yale. It provided access when the Fraser River froze over in the winter.

- **104th Avenue: Hjorth Road** - In 1885, the Norwegian Hans Christian Hjorth was the first of a number of fishermen to move up from his Fraser River shack to locate on what became 104th Ave. He returned to his native Norway but his name remains. Hjorth Road has been on Surrey maps as far back as 1892.

- **112th Avenue: North Road** - Broken parts of 112th Avenue extend along the north-facing slope of the south bank of the Fraser River, therefore the name North Road. The west end of 112th Avenue is in the vicinity of Pattullo Bridge.

2. North-South Roads in Surrey City Centre

Street	As shown on 1938 map	As shown on 1957 map
132nd St	Roebuck Road	
132A St		Saskatchewan Road
133rd St	Dean Road	Moth Road, Chaplin Road
133A St		Wagstaff Road
134th St	Unwin Road	
134A St		McAlpine Road
135th St		Burroughs Road
135B St		Bruce Road, Riverview Road
136 St (King George Blvd)	Peace Arch Highway	
136A St		Deanna Road, Speers Road, Torkington Road
137th S		Devon Road, Kathleen Road
137A St		Robert Road, Taylor Road
137B St		Cunningham Place
138th St		Rowberry Road
138A St		Hoehn Road
139th St		Forsythe Road
139A St		Cecil Road, Ness Road
140th St		Nichol Road

Source:
http://members.shaw.ca/jack_brown/namestonumbers.html

D. Identified Heritage Resources

1. St. Mary's Ukrainian Greek-Orthodox Church

10765 135A Street | Surrey Heritage Register | Not currently protected

Description of Historic Place

St. Mary's Ukrainian Greek-Orthodox Church is located in a mixed commercial and residential part of the Whalley neighbourhood of Surrey. Its distinctive roof form is a landmark in the area.

Heritage Value

St. Mary's Ukrainian Greek-Orthodox Church is significant as a landmark place of worship for over half a century. A large population of Ukrainian-Canadians were among the many groups of people that settled in Whalley, and they soon recognized the need for their own place of worship. After the church property was purchased about 1948, through donations and fundraising, construction on the church began in 1950, and was completed in 1955 with volunteer labour. The use of the historical style for the church, at a time when many churches chose to build in new modern styles, indicated a strong desire to maintain a distinct community identity. St. Mary's is valued for its traditional Greek-Orthodox architectural features, such as the cross gabled roof on a Greek cross plan, with an octagonal dome over the central interior space. The interior also features traditional elements such as a carved iconostasis screen. It remains a symbol of the Ukrainian community, and traditional Ukrainian Greek-Orthodox services are still held at St. Mary's.

St. Mary's is also significant for its association with the development of the Whalley neighbourhood, which originated as a local service centre after the Pacific Highway was paved in 1923. This became a favoured location for auto-based businesses, and local growth accelerated with the opening of the Pattullo Bridge in 1937, and the completion of the King George Highway in 1940. The transportation corridors throughout the area facilitated rapid settlement after the end of the Second World War.

Character-Defining Elements

Key elements that define the heritage character of St. Mary's Ukrainian Greek-Orthodox Church include its:

- location near the centre of Whalley;
- continuous use as a Ukrainian Greek-Orthodox church;

- form, scale and massing as expressed in the complex three dimensional articulation, Greek cross plan, bell towers flanking the central entry and a central octagonal dome marking the crossing of the transepts;
- traditional elements of Greek-Orthodox church architecture, including the concave flared octagonal dome and octagonal turret roofs surmounted by Orthodox crosses, round-arched window openings and the interior cruciform volume;
- wood frame construction, with wooden siding under the later vinyl siding;
- exterior elements such as: sheet metal cladding on the domed roofs; square, partially inset bell towers on each side of the central front entry; complex fenestration with multi-paned single-assembly sash surmounted with round-arched tops with fan pattern muntins; and a single octagonal window above the front entry;
- interior elements such as: a carved iconostasis screen and coloured glass panels in the windows;
- twin brass name plaques flanking the central front entry, in English and Ukrainian; and
- associated landscape structures such as a wrought iron fence with concrete fence posts and a concrete arch marking the entrance.

2. Goodmanson Building (Round Up Cafe)

10449 King George Boulevard | Surrey Heritage Register | Not currently protected

Description of Historic Place

The Goodmanson Building, which houses the Round Up Cafe, is a one-storey commercial building located at the north end of a commercial strip development on the King George Highway, in the Whalley neighbourhood of Surrey. A prominent neon sign, reading 'Round Up Cafe', overhangs the sidewalk above the main entrance.

City of Surrey Archives

Heritage Value

Built in 1949, the Goodmanson Building is valued as a testament to Whalley's origins as an automobile-oriented service center and as a representation of the type of single-storey commercial strip development that defined the area's character for decades. After the Pacific Highway was paved in 1923, Whalley became a favoured location for auto-based businesses. Local growth accelerated with the opening of the Pattullo Bridge in 1937 and the completion of the King George Highway in 1940. After the tolls were removed from the Pattullo Bridge in 1952, Whalley experienced a major commercial and residential building boom.

The Goodmanson Building is also significant as the location of the Round Up Cafe, which has served the Whalley neighbourhood for over fifty-five years. Len Goodmanson built the original structure on the property in 1949, housing the Round Up Cafe, which Goodmanson owned until

1961. Since 1973, the restaurant has been owned and operated by the Springenatic family, who have maintained the essential roadside diner character, appearance and menu. Typical of the era in which it was established, the large neon sign was a response to the width of the street and the speed of passing cars, enticing customers with its bold shape and colours. Such signs have seldom survived in connection with their original businesses; the Round Up Cafe and its neon sign are therefore a rare combination. The name of the restaurant recalls the postwar popularity of Western stories, both in Hollywood movies and in the emerging medium of television.

Character-Defining Elements

Key elements that define the heritage character of the Goodmanson Building include its:

- location adjacent to King George Highway with no setback from front and side property lines
- commercial form, scale and massing as exemplified by its one-storey height, rectangular plan, central recessed entry and flat roof
- wood frame construction with stone masonry on storefront under later stucco and aluminum
- prominent projecting 'Round Up Cafe' sign with metal sign can and neon tubing overhanging sidewalk above main entrance
- plate glass storefront windows
- interior features, such as original seating configuration and kitchen cupboards continuous use as a diner

3. Roll's Carpenter Shop

13946 Fraser Highway | Surrey Heritage Register | Protected by HRA By-law, 2007, No. 16362

Description of Historic Place

Roland Earl Wilfong and Olive Anne Wilfong acquired a block of eight approximately 1-acre lots between Pacific Highway (now Fraser Highway) and Townline Road (now 96 Avenue) immediately west of Nichole Road (140 Street). Shortly thereafter, "Rolls Carpenter Shop", likely named after the owner, was built facing Pacific Highway, later becoming the Trans Canada Highway and now Fraser Highway. The land was acquired in 1969 and remained in the Lehman family until 2006. It is not certain whether the shop ceased to operate before or after family ownership changed.

Character-Defining Elements

Key elements that define the heritage character of Roll's Carpenter Shop include its:

- "Boom town front" (false storefront) facing Fraser Highway.

- The large storefront four-pane wood windows;
- The existing "unique wood appliqué sign" (the "Sign") with individual letters mounted in a semi-circular fashion on the false front;
- The wrap around shed roof along Fraser Highway;
- The shallow-pitched gable roof with integrated vents;
- The brick chimney;
- The exterior metal siding on the upper portion of the building;
- The horizontal wood cladding at the base of the building;
- The wood fascia boards;
- The wood windows and doors, style and trim (turquoise in colour, in keeping with the era of construction);
- The relationship of the building to the street, the site, and to natural grade.

4. King George Boulevard

Surrey Heritage Register | Not currently protected

In original legal plans from the 1930's, the road connecting the Patullo Bridge with the Canada-US border crossing at Douglas was called the "Peace Arch Highway". Following the 1939 Royal Visit of King George VI and Queen Elizabeth, Surrey Council approved the renaming of this road to "King George VI Highway" in April 1940 by notice in the BC Gazette. The road was commonly known as King George Highway until 2009 when Surrey Council approved the renaming of the road to King George Boulevard.

The generally accepted historical account is that as a commemoration of the Coronation of King George VI in 1937, both sides of King George Highway from the Patullo Bridge to the Peace Arch were planted at approximately 100 foot intervals with English Oak trees imported from Great Windsor Park, England.

Disease and the development of lands along King George Highway over the years have claimed many of these trees. The main remaining concentration is located in South Surrey between the Nicomekl River and 8 Avenue. Some maple and other species of trees were part of this same planting plan, some of which are located north from Highway No. 10 towards Newton.

5. Ponderosa Pine (Pinus ponderosa)

10375 - 133 St. | Heritage Tree | Not currently protected

6. Giant Sequoia (Sequoiadendron giganteum)

10375 - 133 St. | Heritage Tree | Not currently protected

E. Potential Heritage Resources

The following sites have been identified as potential heritage resources in Surrey City Centre. They are representative examples of the character of the older building stock in the area. Further assessment would be required to determine whether they possess sufficient heritage value to merit addition to the Surrey Heritage Register.

1. 10522 King George Boulevard, Rickshaw Sign

Preliminary assessment:
- This neon sign has been a landmark along King George Boulevard for many years.
- Previously not considered for addition to the Surrey Heritage Register based on HAC recommendation of December 11, 1997 when it was determined that the sign was from the 1970s. More recent research indicates that the sign likely dates from at least the mid-1960s.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Private ownership.

2. 13667 Grosvenor Road

Preliminary assessment:
- This house has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for adaptive re-use as unit/amenity building as part of future townhouse/apartment development or small scale commercial.
- Designated for up to 2.5 FAR residential. Mixed-use could be considered if owner agrees to enter into HRA.
- Private ownership.

3. 13683 Grosvenor Road

Preliminary assessment:
- This house has not previously been considered for addition to the Surrey Heritage Register (further assessment required).
- Potential for adaptive re-use as unit/amenity building for future townhouse/apartment development (designated for up to 2.5 FAR residential).
- Private ownership.

4. 13697 Grosvenor Road

Preliminary assessment:
- House has not previously been considered for addition to the Surrey Heritage Register.
- May or may not be good candidate for addition to Surrey Heritage (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

5. 13761 Grosvenor Road

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- HRA could be negotiated through rezoning/subdivision.

6. 13821 Grosvenor Road, Surrey Vietnamese Alliance Church

Preliminary assessment:

- Building has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential candidate for adaptive re-use as day care, community facility (designated for future park).
- Private ownership.

7. 13842 Grosvenor Road

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

8. 13834 Grosvenor Road

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

9. 13723 Larner Road

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

10. 13809 Berg Road

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

11. 13753 108 Avenue, Ukrainian Holy Cross Catholic Church

Preliminary assessment:

- Building has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued institutional use or for adaptive re-use as amenity building as part of future townhouse/apartment development.
- Currently designated for up to 2.5 FAR residential. Mixed-use designation could be considered if owner agrees to enter into HRA (pending outcome of further heritage assessment).
- Private ownership.

12. 13642 Larner Road

Preliminary assessment:

- Excellent and well-maintained example of early suburban bungalow.
- House has not previously been considered for addition to the Surrey Heritage Register.
- Unlikely candidate for addition to Surrey Heritage Register (further assessment required).
- Likely low potential for adaptive re-use as unit/amenity building as part of future townhouse/apartment development due to style/age of home (designated for up to 2.5 FAR residential).
- Private ownership.

13. 13674 111 Avenue

Preliminary assessment:

- Excellent and well-maintained example of early suburban bungalow.
- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

14. 13756 112 Avenue (also small barn on property)

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Potential for HRA to be negotiated through rezoning/subdivision.
- Private ownership.

15. 11122 134A Street

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

16. 10689 140 Street

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential candidate for adaptive re-use (designated for future park)
- City ownership.

17. 10504 139 Street

Preliminary assessment:

- Building has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued institutional use or for adaptive re-use as part of future townhouse/apartment/commercial development (designated for up to 2.5 FAR mixed-use).
- Private ownership.

18. 13219 + 13229 104 Avenue

Preliminary assessment:

- This house has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for adaptive re-use as unit/amenity building as part of future townhouse development (designated for up to 2.5 FAR residential; interface with single family west of plan area).
- Private ownership.

19. 9569 134A Street

Preliminary assessment:

- This house has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for adaptive re-use as unit/amenity building as part of future townhouse/apartment development (designated for up to 2.5 FAR residential).

20. 13240 100 Avenue

Preliminary assessment:

- House has not previously been considered for addition to the Surrey Heritage Register.
- Potential for addition to Surrey Heritage Register (further assessment required).
- Potential for continued use as a single-family home (designated for 0.6 FAR residential).
- Private ownership.

F. Potential Heritage Interpretation Opportunities

1. Whalley's Corner (5 Corners)

Grosvenor Road, King George Boulevard, 108th Avenue

- Potential for "unique treatment for the "Five Corners" intersection".
- Potential for public plaza in vicinity of this location.
- Potential for interpretation/public art related to Arthur Whalley/Whalley's Corner.

City of Surrey Archives

2. Binnie Block

East side of King George Boulevard north of 108th Avenue

- In the short term, there may be potential for nurturing the existing "eclectic" businesses/encouraging maintenance of the 1940s buildings.
- In the long-term, potential for interpretation.

City of Surrey Archives

3. The Junction

100th Avenue and King George Boulevard

- Potential for unique treatment of this intersection.
- Potential for a plaza to be incorporated into new development.
- Potential for re-introduction of the place-name "the Junction".
- Potential for interpretation related to the significance of this intersection.

4. Dell Shopping Centre

10558 King George Boulevard

- Potential for interpretation related to the significance of one of Surrey's oldest shopping centres, designed as a shopping plaza oriented to the Highway.

5. The "Whoopee-Dipper" and Peat Bog

104th Avenue and King George Boulevard

The Whoopee-Dipper (a roller coaster for cars) was constructed near King George Highway and 104th Ave in 1929. A peat bog also existed in this vicinity. Surrey writer, Bill Hastings, once penned an article titled to the effect of "How Surrey defeated the Nazis" in reference to the exports from the Peat Bog to the U.S. during WWII.

- Potential for heritage interpretation or public art in this vicinity.

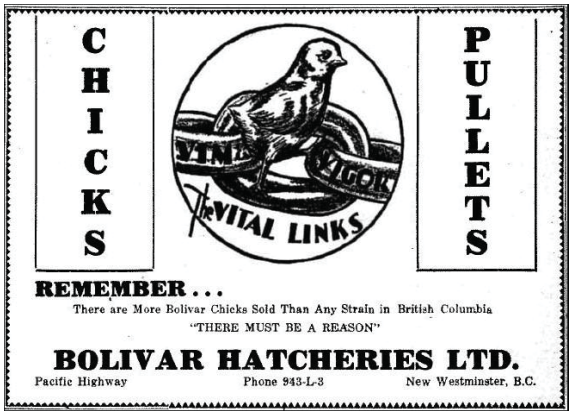
6. Bolivar Mansion

13453 111A Avenue (relocated)

- This house was once home to Haddon Bolivar and his family.
- The building has been significantly altered so the potential for restoration is very low
- Potential for interpretation related to the Bolivar family and the Florence Nightingale Hospital.

7. Bolivar Hatcheries

- Potential for interpretation related to the Bolivar family, the operation, and the neon signage.



8. North Surrey Recreation Centre

- Potential for interpretation related to the community's fight for a recreation centre in their neighbourhood.

9. Whalley Little League

- Storyboard already exists.
- Potential to revitalize storyboard.

10. Bolivar Creek

- Potential for nature interpretation.

11. Quibble Creek

- Potential for nature interpretation.

A-2.5

Mid Century Modern in Surrey's City Centre

Mid-Century Modern
in Surrey's City Centre



1. INTRODUCTION

Background

As part of the City Centre Land Use Plan process, a Heritage Review was conducted in 2011 to uncover the historical assets in the plan area.

As a result of the Heritage Review, a Historic District was identified in the City Centre Plan. Many buildings dating back to the mid-century modern timeframe were identified; the highest concentration of these buildings was found to be in the northern section of the plan area. This area has now been identified as the "Historic District" in the draft City Centre Plan document. Figure 1 shows a sketch of this district area.

In addition, special street blades signs have been developed and installed around the Whalley's Corner at 108 and King George Boulevard to identify the Historic District (Figure 2).

Purpose of the 2015 Review

While the 2011 review captured the early settlement and the mid-century development in Surrey's City Centre, it did not provide details of the specific Mid-Century Modern structures and the related design elements. This study will supplement the previous review and provide additional detail on the mid-century modern era of buildings in the City Centre in order to support the development of the Design Guidelines in the Historic District of the City Centre Plan.

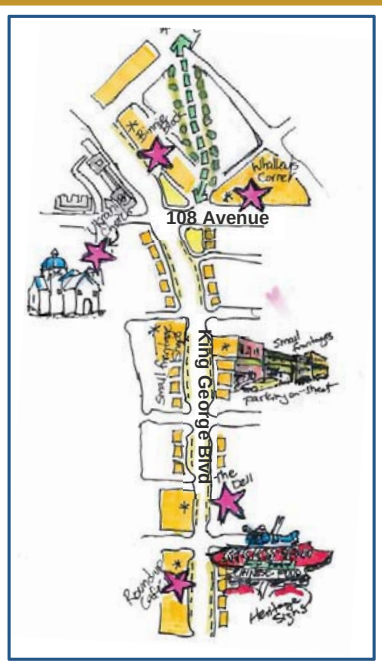


Figure 1. Historic District in Surrey City Centre

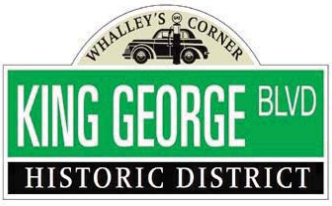


Figure 2. Historic District Signs

Goals of the Review

Mid Century Modern design predominately influenced earlier development in the North Surrey area. Commercial development in this area increased after the construction of the Pattulo Bridge in 1937. The development momentum increased in the mid to late 1950's, after the bridge tolls were removed in 1952. During this period, Whalley became a vital, prosperous and popular commercial district. The building boom during this time was characterized by the prevalence of Mid-Century Modern style.

Much of the value of this architectural era has not been appreciated until more recently. We are now seeing cities throughout North America starting to embrace their stock of mid-century modern structures. They are finding that while some buildings have been maintained over the past 60 years, others are starting to deteriorate, or have been vacant and have led to decline of neighbourhoods. As a result many cities are now promoting preservation, or adaptive reuse through renovation to catalyze transformation and economic development of these areas.

This review of the City Centre mid-century modern era will help support the preservation, as well as redevelopment and place making & revitalization of the Historic District in City Centre. It will also help establish a design aesthetic that is unique and authentic to Whalley, and provide a basis from which to create place making and design guidelines for future redevelopment of the Historic District in the City Centre Plan. The Mid-Century Modern Review will:

Support the City Centre Plan

- Inventory significant design elements that contribute to the design aesthetic of early development in Whalley
- Provide direction and guidelines for preserving the mid-century character for proposed renovations to existing buildings in the Historic District in the City Centre Plan
- Provide a basis for Design Guidelines for new development within the Historic District of the City Centre Plan

Promote a Positive Image of Whalley

- Attract a new appreciation of the existing Mid-Century Modern architecture in Whalley
- Show the positive value of the existing building landscape through historical appreciation of Whalley
- Educate the businesses and residential community on Mid-Century Modern structures in Whalley

2. MID-CENTURY MODERN DESIGN

What is Mid-Century Modern?

- Mid-century modern is an architectural, interior, product and graphic design that generally describes mid-20th century developments in modern design, architecture and urban development from roughly 1933 to 1965. The timeframe is a modifier for the larger modernist movement, which has roots in the Industrial Revolution at the end of the 19th century and also in the post-World War I period.

- The movement began in Europe after WWI, but gained momentum during the second half of the twentieth century; the influence was more visible in Canada in the 1940's.

- The aesthetic could be described as " post-war minimalism" , a departure from placing primary importance and building on historical styles of the past, and a move towards looking into the future with a " modern" based approach.

- Design elements includes: clean simple lines, use of geometrics, and natural materials. Designers were fans of aluminum, steel, wood and fiberglass, and plainly painted masonry; allowing an " honesty" in materials.

Mid Century Modern Design Elements

Post & Beam Construction

- A building method using a framework of upright and horizontal beams.
- This type of construction allows for open spaces that flow from the inside to the outside with high transparency between the two realms.
- It creates low, horizontal massing, flat roofs, with emphasis on horizontal planes and broad roof overhangs, and floor to ceiling windows.

Lack of Ornamentation:

- use a clean lines and aesthetic
- Simple construction features

Local example: 13511 108 Ave Surrey

Other examples of Post & Beam Construction

Mid Century Modern Design Elements

Rectangular Forms and Horizontal and Vertical Lines

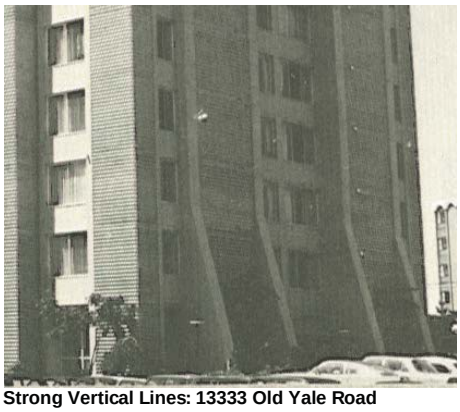
- Low-sloping and flat rooflines are common among all types of structures.
- Office and commercial structures are commonly found with flat roofs, while residential and institutional structures are found to showcase low sloping rooflines as well as butterfly rooflines.

Vertical Mullions

- Vertical mullions are a distinctive feature of many mid-century modern office buildings.
- They are structural elements which divide adjacent window units. They can be metal or concrete. Placed vertically, they are designed to exaggerate a building's true height.

Strong horizontal line- 13511 108 Ave Surrey

Vertical Mullions 9656 King George Blvd



Strong Vertical Lines: 13333 Old Yale Road

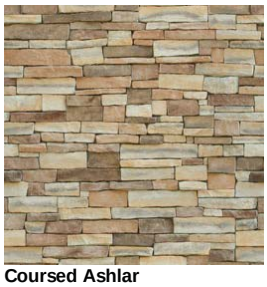
Mid Century Modern Design Elements

Honesty of Materials:

- Wood is often stained rather than painted to express its natural character.
- Brick is often used for commercial, institutional, and office structures. Several patterns, such as the **Coursed Ashlar**, **Common Bond**, and **Dutch Cross Bond** patterns, are favored by mid-century modern design style and used to add visual interest.
- The **Stacked Pattern** (or **Stacked Bond**) was the most heavily used pattern. The pattern is made of rows of stretchers with each stretcher centred on the stretcher below it. The invention of veneer construction occurred during the era, allowing the stacked pattern to exist.

Stacked Bond Brick

Roman Brick



Coursed Ashlar

Wood Soffit & Floor to Celiing Windows

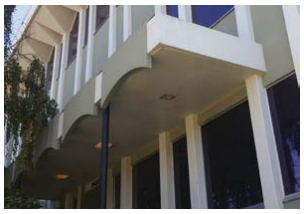
Mid Century Modern Design Elements

Concrete as Finishing Material

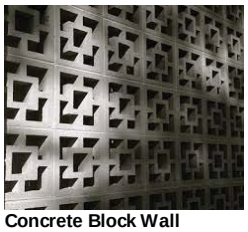
- Concrete masonry was used as a finishing material, rather than just structural element
- Pre-cast concrete shapes were used bold geometric shaped canopies
- Concrete blocks with geometric patterns were used to create walls, screens and forecourt enclosures
- Ribbed concrete walls were used for interest

Concrete Cornice: Surrey

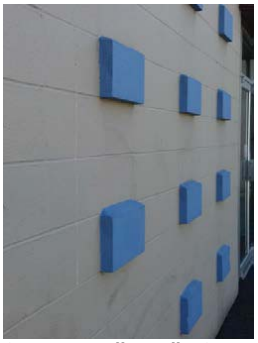
Concrete Canopy: Chicago



Concrete Canopy: Surrey



Concrete Block Wall



Concrete Wall Details: Surrey

Mid Century Modern Design Elements

Geometric Shapes

- Bold and unique geometric shapes were used to create building forms and also for building details

Michigan

Surrey

Cylindrical Element

- Cylindrical elements are often found in Mid-Century Modern construction. Ceramic tile and/or concrete aggregate are common materials used to clad these elements

Michigan

Surrey

Mid Century Modern Design Elements

Muted Colour Palette

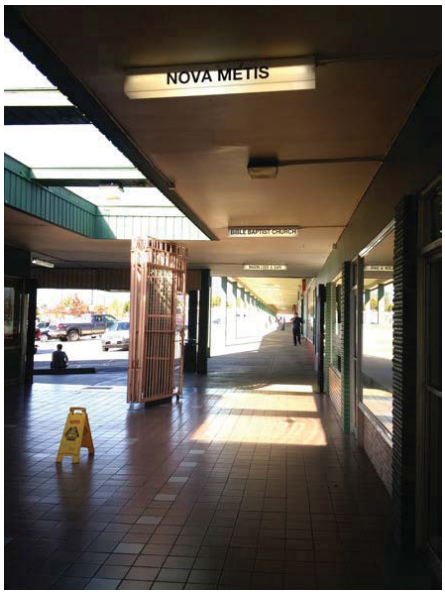
In the 1950's many muted colours were part of the paint palette including yellow, grey, blue and green.

Mid Century Modern Design Elements

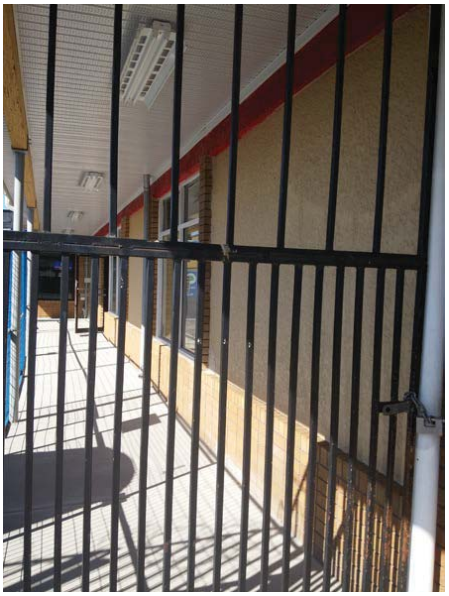
Breezeways and Forecourts

- Forecourts are an open area of varying sizes created for the pedestrian that lies before the entrance of a structure that has decorative landscaping and is used as a public space.

- The purposes of forecourts are broad: for commercial and office structures a forecourt may serve as a recreational area to be used at lunchtime or on breaks.



Breezeway at Dell Shopping Centre


Forecourt Area at Shop Along King George Blvd

3. MID-CENTURY MODERN REINTERPRETATION

Mid Century Modern Elements in New Construction

Restaurant with Mid-Century Modern Elements

A. Flat Roof Line

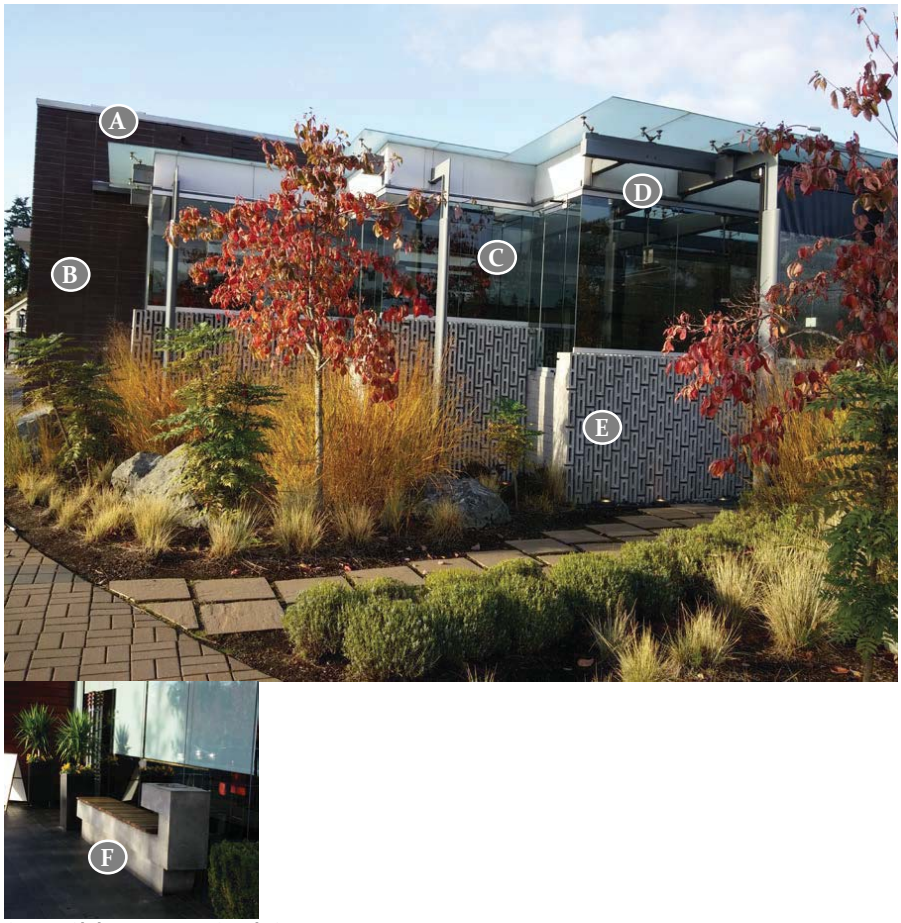
B. Stacked Bond Brick Pattern

C. Large Fixed Glass Walls

D. Post & Beam Construction that connects inside with outside

E. Concrete Block Pattern Walls

F. Geometric Shaped Concrete Bench with natural wood accent



Cactus Club Restaurant South Surrey

Mid Century Modern Elements in New Construction

Institutional Buildings with Mid-Century Modern Elements

A. Large Overhang with Wood Soffit

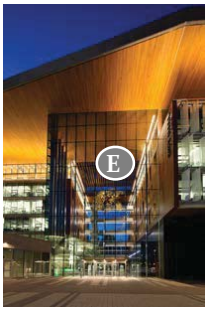
B. Large Fixed Glass Area

C. Concrete Formed Stairs

D. Concrete Cast Wall with Geometric Cut-out Shapes

E. Concrete Block Pattern Wall

F. Connection of Indoors with Outdoors



Surrey City Hall

Mid Century Modern in New Construction

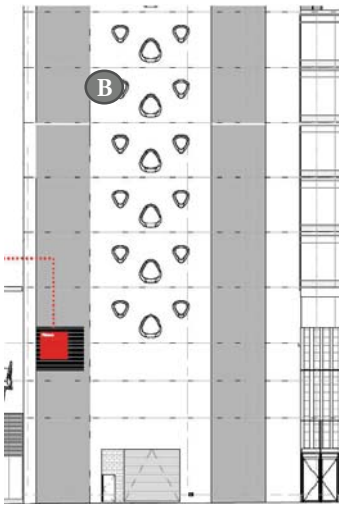
Mixed Use Development with Mid-Century Modern Elements

A. Flat Roof

B. Concrete Cast Wall with Geometric Cut-out Shapes

C. Strong Vertical Massing

D. Extensive Use of Glass



3 Civic Plaza Building, Surrey (currently under construction)

Mid Century Modern in New Construction

Office Building with Mid-Century Modern Elements

A. Flat Roofline & Horizontal Massing

B. Cantilevered Overhang

C. Extensive use of Glass

D. Butterfly Roof Element

City Centre 1 Medical Building, Surrey

4. BUILDING INVENTORY

The following section provides an inventory of buildings that were built in the mid-century era in Whalley. These buildings in the Downtown Historic District exhibit evidence of multiple stages of construction, reconstruction, and remodeling. The study finds that two buildings and one sign that warrant a detailed heritage evaluation. These have been identified as potential heritage resources, and could be considered for addition to the Heritage Register.

The remainder of the buildings have been categorized as having “heritage value”. These buildings may not warrant preservation due to several factors including significant alteration, or major deterioration, or do not have significant individual value for preservation. However these buildings are worth noting, because they do contribute to the historic Mid-Century Modern character of the Whalley area.

The Inventory has been organized into 3 categories:

- On the Heritage Register
- Potential Heritage Resources
- Additional Site of Heritage Value

On the Heritage Register

Goodmanson Building (Round Up Café)
10449 King George Boulevard

- Sign on the Goodmanson Building—built in 1949
- One of two of the rare surviving examples of neon illuminated signs that dominated the King George downtown commercial corridor.
- On the Heritage Register

Potential Heritage Resources

North Surrey Medical Building
9656 King George Boulevard

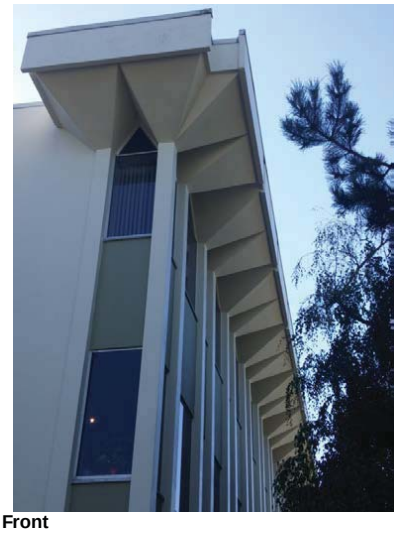
Built in 1969, by Architect Peter Cole, this building is constructed of simple concrete material and glass and presents a muted colour palette.

Concrete is used to frame windows and doors and is shaped in a unique geometric form. The arches and columns and cantilevered areas are clad with concrete to add simplicity to the structure.

The style embraces the weightiness of masonry forms, exaggerates sense of mass, heavy materials, and unusual geometric shapes.

Building elements include:

- heavy massing
- flat roof
- concrete form framed windows
- unique geometric forms in eaves
- strong vertical lines created by use of concrete vertical mullions
- muted colour palette
- dramatic shaped pre-cast concrete canopy supported by slender metal columns



Front

Rear

Potential Heritage Resources

North Surrey Medical Building
9656 King George Boulevard
(continued)

Building elements include:

- glass door with narrow aluminum frame
- terrazzo floors (interior)

Caption that appeared with the 1969 photograph to the right stated: " This half million dollar medical centre built by North Surrey doctors brings a distinctly oriental atmosphere to King George Highway just north of 96th Avenue."

Heritage Evaluation Recommended

Potential Heritage Resources

Cameo Theatre
13551 King George Boulevard

Part of Binnie Block, started construction in 1947, this building was built in 1954. This was a very recognizable building for the community

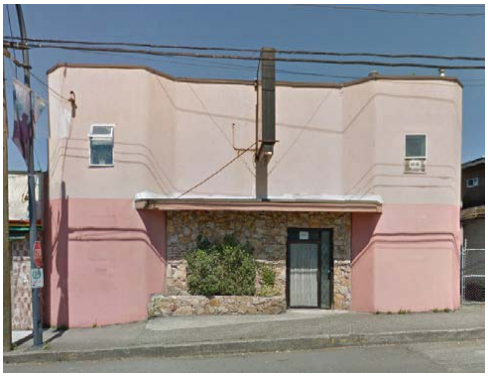
(can we get any written info from archives?? To support this)

Design elements include:

- simple clean lines
- minimalist design
- recessed entry
- structural canopy
- flat roof
- glass door with narrow aluminum frame

Projecting sign above canopy (not original), but use of projecting sign above canopy is part of the original design aesthetic. Material on the recessed entry has been altered from the original glass doors to the stonework.

Heritage Evaluation Recommended



Potential Heritage Resources

Rickshaw Sign
10522 King George Boulevard

- Monument signs, intended to capture the attention of motorists, were a prominent feature of mid-century design.
- This sign is one of two of the rare surviving examples of neon illuminated signs that dominated the King George downtown commercial corridor.
- Built approximately in mid 1960's
- Includes neon tube and single lights

On the Heritage Inventory

Additional Sites of Heritage Value

Hassell Building

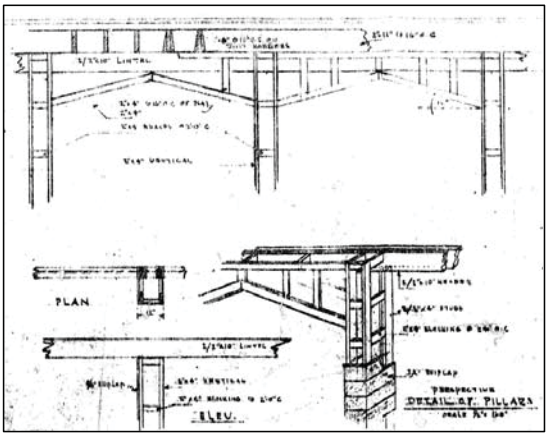
13655 & 13659 King George Boulevard

Built in 1963 for Mr. Hassell, who was a prominent Surrey figure. During the 1960's he was heavily involved in community groups. In photograph below, he is shown in a Jaycee event in Cloverdale (1963), a Chamber of Commerce dinner in White Rock (1963), and a hospital presentation in 1965. Mr. Hassell is listed as the Hospital Board Chairman at Peace Arch Hospital, a member of the White Rock Chamber of Commerce, and a regional Vice President of the Cloverdale Jaycees.

Design elements for this building include:

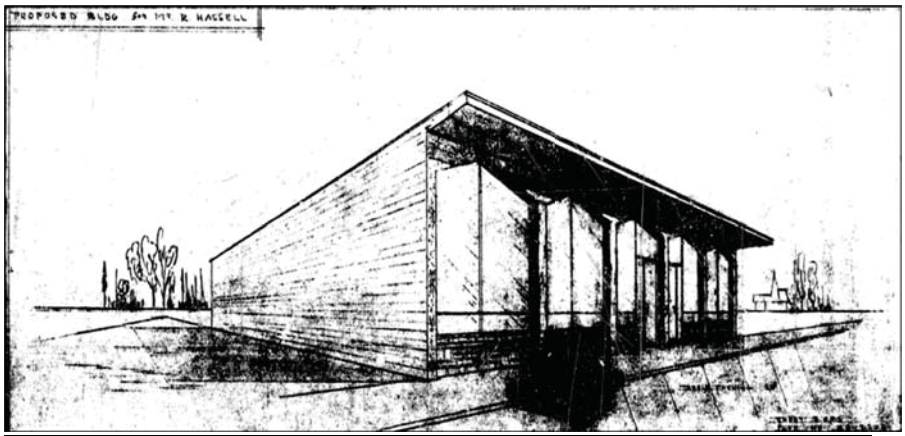
- concrete formed around windows
- muted colour palette
- flat roof
- clean geometric lines
- horizontal massing
- brick work
- structural canopy/large roof overhang
- glass door with narrow aluminum frame

Alterations include newer concrete blocks that likely replaced old concrete cast planter, brick work likely not original.



Additional Sites of Heritage Value

Hassell Building
13655 & 13659 King George Boulevard
(continued)



Additional Sites of Heritage Value

Jenson Hamilton Building

13639 & 13649 108 Avenue

This building is currently the Metis Family Services Building. It was built in 1965, owned by Mr. Hassell and built for Jenkins and Hamilton.

The building is currently well maintained. It was significantly altered in a renovation in 1983 and was named the Whalley Professional Building. At that time the breezeway was enclosed to create a waiting room and reception area with one entrance. A patterned concrete block screening the windows was removed, and colour palette was changed

Design elements from the original structure that are visible today include:

- low profile and strong horizontal massing
- flat roof
- post & beam construction
- stacked bond brick on rear façade of building
- simple clean lines

Front Facade

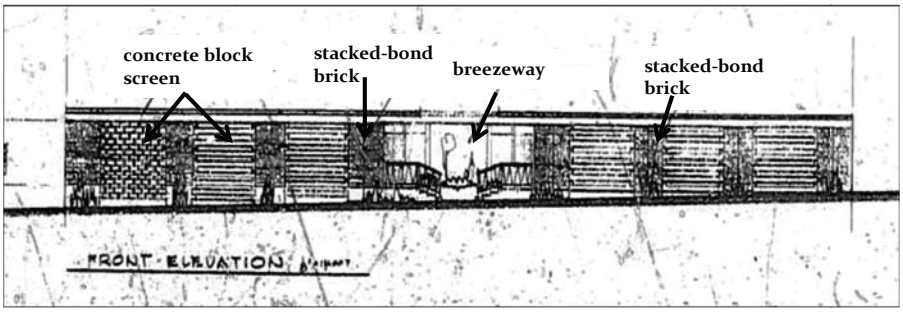
Stacked Bond on Rear Facade

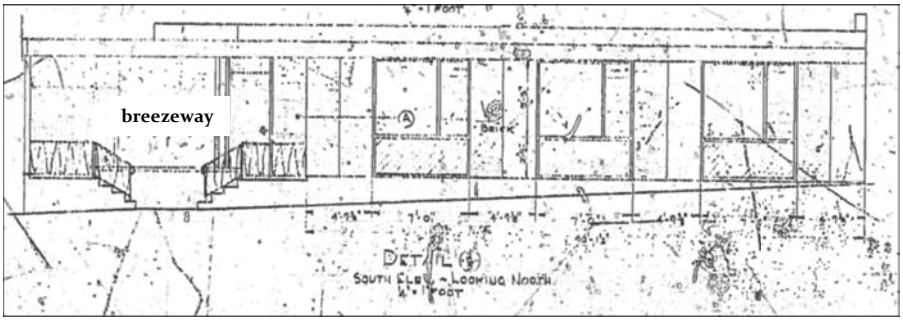
Enclosed breezeway area

Additional Sites of Heritage Value

Jenson Hamilton Building
13639 & 13649 108 Avenue
(continued)

- Originally, the building had an open courtyard and breezeway between two office buildings.
- Windows on the front elevation were screened behind a decorative concrete block wall.
- The brick was in a stacked bond pattern, and is still preserved on the rear façade.





Additional Sites of Heritage Value

Budget Appliances
13511- 108 Avenue

Built in 1963, this is one of the few remaining exposed post and beam construction office buildings still remaining in Whalley.

Design Elements include:

- Exposed post & beam construction
- structural transparency—with windows right up to eaves
- low horizontal massing
- emphasis of rectangular form
- clean and simple architectural lines.

Alterations likely include solid slab doors, paint on the wood beams and wood panelling on façade

Front Facade

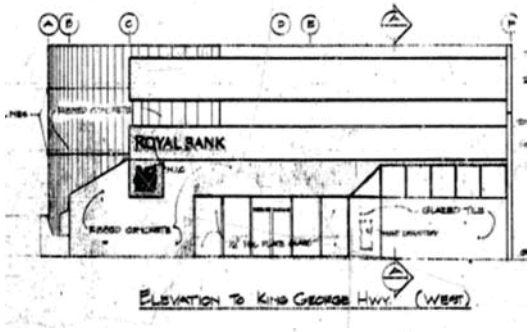
Additional Sites of Heritage Value

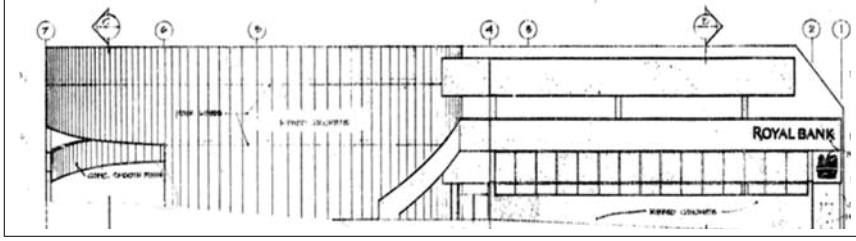
Original Royal Bank
(Now RCMP Office)
107__ King George Blvd

The original Royal bank Building was built in 1974.

Design elements include:

- concrete walls
- Heavy massing
- Neutral colour palette using natural concrete colour
- Flat roof
- Clean simple lines
- Cylindrical element





Additional Sites of Heritage Value

Ted Kuhn Tower
13652 Old Yale Road

This Seniors Housing was built in 1970.

Design elements include:

- Ribbed concrete walls
- vertical mullions
- Geometric concrete base
- Heavy massing
- Neutral colour palette using natural concrete colour
- Flat roof
- Clean simple lines

Additional Sites of Heritage Value

Surrey Drugs
(now Sprite Multimedia Systems)
13597 King George Boulevard

Part of Binnie Block (circa 1950's)

Design elements include:

- Geometrically linear
- clean simple lines
- suspended canopy (is now covered by signage, but original can be seen behind signage).
- glass door with narrow aluminum frame
- roman brick pattern is still original

Original roman bricks on façade exist today

Additional Sites of Heritage Value

Binnie Block
13539 & 13545 King George Blvd

- Part of Binnie Block, building circa 1950's.
- Don't know the name of the original businesses, but very run down now.
- Part of the original canopy is intact as well as roof form.

Original roof line and canopy is evident today

Additional Sites of Heritage Value

Flamingo Hotel and Shops

10768 & 10762 King George Boulevard

Originally built in 1962, this building was built with a strong mid-century modern aesthetic with brick and glass façade and strong horizontal lines.

The hotel has been heavily altered over time, undergoing many renovations. The individual shop fronts adjacent to the hotel still show elements of the original building.

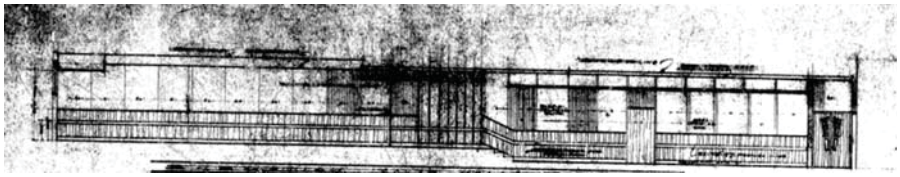
Design Elements on small shops include:

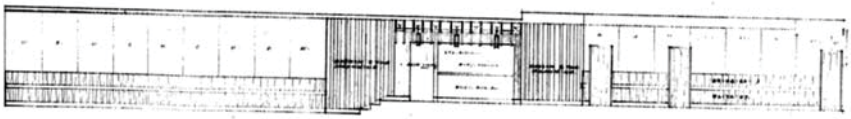
- Narrow storefront widths
- Strong horizontal massing, clean lines
- Flat roof, low profile design
- Post & beam construction
- Large glass windows, aluminum lined (right up to eaves)
- Glass doors with narrow aluminum frame

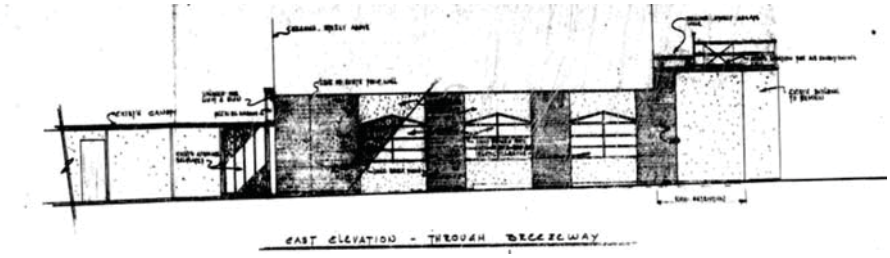
Additional Sites of Heritage Value

Flamingo Hotel and Shops
10768 & 10762 King George Boulevard
(continued)

- Originally a breezeway connected two sides of the building, with a café on one side and hotel on the other.







Additional Sites of Heritage Value

Dell Shopping Plaza
10580 & 10598 King George Boulevard

Surrey's oldest shopping plaza, built in late 1960's.

Design elements include:

- Low profile, clean lines
- Strong horizontal massing
- Structural canopy supported by slender metal columns
- Stacked bond brick on some storefront facades
- Large glass frontages on stores

Alterations: original canopy is covered with bubble canopy, and steel columns covered, some brick has been painted

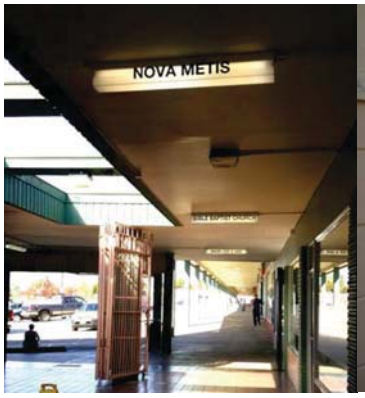
Site is approved to undergo renovations to the façade.

Additional Sites of Heritage Value

Dell Shopping Plaza
10580 & 10598 King George Boulevard
(continued)

Design elements include:

- Concrete patterned wall on 107 Ave
- Breezeway with skylights
- Jealously windows
- Lighting under large roof overhang



Additional Sites of Heritage Value

Ukrainian Cultural Centre

10580 & 10598 King George Boulevard
(continued)

The Ukrainian Cultural centre was built in 1964 and reflects the style of the mid-century. The neighbouring church was built with the historic style with Greek architectural features (when many churches chose to build in the modern style).

Design elements include:

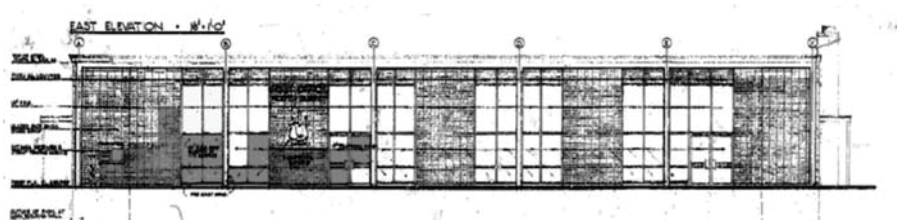
- strong geometric shapes,
- concrete form and heavy massing.
- Aluminum framed glass doors on 108 Avenue.

Original building material has been covered with vinyl siding along 135A-St frontage and above entrance on 108 Avenue frontage and the concrete has been painted beige and blue. Area above 108 Avenue entrance appears to be altered with vinyl siding and window, original window might have been larger.

Additional Sites of Heritage Value

Surrey Post Office
10688 King George Boulevard

- Built in 1964 to replace (Whalley's Corner Post office from 1947)
- The building was renovated in 1975. The original façade was set further back from King George Blvd, a new addition was added along the street edge.



Additional Sites of Heritage Value

Original Kinsmen Place Lodge
13333 Old Yale Road

Built in 1974

- **1961** Whalley & District Senior Citizens Housing Society, a non-profit organization, is incorporated to provide seniors housing in Surrey.
- **1973** The construction of Kinsmen Place Lodge begins
- **2005** The Fraser Health Authority advises Kinsmen Place Lodge that the building requires either extreme updating or rebuilding in order to comply with the new regulatory codes for a complex care facility.
- **2006** Kinsmen Place Lodge negotiates to purchase land at 137A Street in Surrey.
- **2008** Lark Construction is secured as developer for the new building. Board and Society members approve the sale of the properties on Old Yale Road to help fund construction of a new building.

Design Elements include:

- Common bond brick
- Heavy massing
- Strong vertical lines
- Flat roof
- Pre-cast concrete arch details at cornices
- Muted colour palette

Resources:

City of Killeen, Texas, Killeen Historic District Design Guidelines, 2009

City of Southfield, Michigan, Southfield Mid-Century Modern Design Guidelines, 2012

Ricketts S., Maitland L, and Huckler J., A Guide to Canadian Architectural Styles, second edition, Broadview Press, 2004

Treleaven,Fern, The Surrey Story, Surrey , Museum and Historical Society, 1978

http://a2modern.org/2011/04/characteristics-of-modern-architecture/ (accessed September 2015)

ACKNOWLEDGEMENTS

The City of Surrey acknowledges the contribution and participation of the following individuals, organizations and staff members in the preparation of this Plan.

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Surrey City Centre Plan

Planning and Development &
Engineering Departments

City of Surrey
13450 104 Avenue
Surrey, British Columbia V3T 1V8

APPROVED BY COUNCIL JANUARY 2017

CITY OF SURREY

ZONING BY-LAW AMENDMENTS RELATED TO AMENITY CONTRIBUTIONS

Proposed Amendments to
Surrey Zoning By-law, 1993, No. 12000, as amended

The following amendments are proposed to Surrey Zoning By-law, 1993, No. 12000, as amended:

AMENDMENTS TO PART 1 DEFINITIONS

1. **Buildable Area**

    - Insert a definition for "Buildable Area" immediately following the definition of "Body Rub Parlour", as follows:

"***Buildable Area***
means building area as defined by the total sum of all floor areas enclosed or partially enclosed by the exterior perimeter of a building or structure including without limitation stairways, elevator shafts, storage rooms, mechanical rooms and basements, and excluding areas for parking that are provided as an accessory use to the building or structure."

AMENDMENTS TO PART 12

2. **Part 12 RA One Acre Residential Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 13

3. **Part 13 RA-G Acreage Residential Gross Density Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 14

4. **Part 14 RH Half Acre Residential Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 15

5. **Part 15 RH-G Half Acre Residential Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 15A

6. **Part 15A RC Cluster Residential Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 16

7. **Part 16 RF Single Family Residential Zone**

    - In Section D. Density 1 delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17

8. **Part 17 RF-G Single Family Residential Gross Density Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17A

9. **Part 17A RF12 Single Family Residential (12) Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17B

10. **Part 17B RF12-C Single Family Residential (12) Coach House Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17C

11. **Part 17C RF10 Single Family Residential (10) Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17D

12. **Part 17D RF10-S Special Single Family Residential (10) Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17E

13. **Part 17E RF9 Single Family Residential (9) Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17F

14. **Part 17F RF9-C Single Family Residential (9) Coach House Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17G

15. **Part 17G RF9S Special Single Family Residential (9) Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 17H

16. **Part 17H RF- SD Semi-Detached Residential Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 20

17. **Part 20 RM-10 Multiple Residential (10) Zone**

    - In Section D. Density 1 delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 21

18. **Part 21 RM-15 Multiple Residential (15) Zone**

    - In Section D. Density 1 delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 21

19. **Part 21A RM-23 Multiple Residential (23) Zone**

    - In Section D. Density 1 (a) delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 22

20. **Part 22 RM-30 Multiple Residential (30) Zone**

    - In Section D. Density 1 delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 23

21. **Part 23 RM-45 Multiple Residential (45) Zone**

    - In Section D. Density 1 delete:

      "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 24

22. Part 24 RM-70 Multiple Residential 70 Zone

- Amend Section D. Density by deleting the entire section and replace with the following:

"1. For the purpose of *building* construction, in all areas described and outlined on the maps attached as Schedule F of this By-law, the maximum *density* shall not exceed a *floor area ratio* of 0.1 or *building* area of 300 square metres [3,230 sq. ft.] whichever is smaller. The maximum *density* of development may be increased to that prescribed in Sub-sections D.2 of this Zone if amenities are provided in accordance with Schedule G of this By-law.

2. In areas other than the ones in Sub-section D.1 of this Zone, the maximum *density* shall not exceed that prescribed in the following:

(a) *Multiple Unit Residential Buildings* and *Ground-Oriented Multiple Unit Residential Buildings*: The *floor area ratio* shall not exceed 1.50.

(b) Indoor *Amenity Space*: The *amenity space* required in Sub-section J.1(b) of this Zone, is excluded from the calculation of the *floor area ratio*."

AMENDMENTS TO PART 25

23. Part 25 RM-135 Multiple Residential 135 Zone

- Amend Section D. Density by deleting the entire section and replace with the following:

"1. For the purpose of *building* construction, in all areas described and outlined on the maps attached as Schedule F of this By-law, the maximum *density* shall not exceed a *floor area ratio* of 0.1 or *building* area of 300 square metres [3,230 sq. ft.] whichever is smaller. The maximum *density* of development may be increased to that prescribed in Sub-sections D.2 of this Zone if amenities are provided in accordance with Schedule G of this By-law.

2. In areas other than the ones in Sub-section D.1 of this Zone, the maximum *density* shall not exceed that prescribed in the following:

(a) *Multiple Unit Residential Buildings* and *Ground-Oriented Multiple Unit Residential Buildings*: The *floor area ratio* shall not exceed 2.50.

(b) Indoor *Amenity Space*: The space required in Sub-section J.1(b) of this Zone, is excluded from the calculation of the *floor area ratio*."

AMENDMENTS TO PART 26

24. Part 26 RMC-135 Multiple Residential Commercial 135 Zone

- Amend Section D. Density by deleting the entire section and replace with the following:

"1. For the purpose of *building* construction, in all areas described and outlined on the maps attached as Schedule F of this By-law, the maximum *density* shall not exceed a *floor area ratio* of 0.1 or *building* area of 300 square metres [3,230 sq. ft.] whichever is smaller. The maximum *density* of development may be increased to that prescribed in Sub-sections D.2 of this Zone if amenities are provided in accordance with Schedule G of this By-law.

2. In areas other than the ones in Sub-section D.1 of this Zone, the maximum *density* shall not exceed that prescribed in the following:

(a) *Multiple Unit Residential Buildings* and *Ground-Oriented Multiple Unit Residential Buildings*: The *floor area ratio* shall not exceed 2.50.

(b) Uses Listed Under Section B.3: The maximum *density* for uses listed under Section B.3 shall be a *floor area ratio* of 0.50 provided that the *density* for the total *lot* does not exceed the maximum stated in Section D.1 of this Zone.

(c) Indoor *Amenity Space*: The space required in Sub-section J.1(b) of this Zone, is excluded from the calculation of the *floor area ratio*."

AMENDMENTS TO PART 27

25. Part 27 RMC-150 Multiple Residential Commercial 150 Zone

- Amend Section D. Density by deleting the entire section and replace with the following:

"1. For the purpose of *building* construction, in all areas described and outlined on the maps attached as Schedule F of this By-law, the maximum *density* shall not exceed a *floor area ratio* of 0.1 or *building* area of 300 square metres [3,230 sq. ft.] whichever is smaller. The maximum *density* of development may be increased to that prescribed in Sub-sections D.2 of this Zone if amenities are provided in accordance with Schedule G of this By-law.

2. In areas other than the ones in Sub-section D.1 of this Zone, the maximum *density* shall not exceed that prescribed in the following:

(a) *Multiple Unit Residential Buildings* and *Ground-Oriented Multiple Unit Residential Buildings*: The *floor area ratio* shall not exceed 3.50.

(b) Indoor *Amenity Space*: The space required in Sub-section J.1(b) of this Zone, is excluded from the calculation of the *floor area ratio*."

AMENDMENTS TO PART 28

26. Part 28 RMS-1 Special Care Housing 1 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 29

27. Part 29 RMS-2 Special Care Housing 2 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 31

28. Part 31 PA-1 Assembly Hall 1 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 32

29. Part 32 PA-2 Assembly Hall 2 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 33

30. Part 33 P-1 Institutional Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 34

31. Part 34 C-4 Local Commercial Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 35

32. **Part 35 C-5 Neighbourhood Commercial Zone**

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 36

33. **Part 36 C-8 Community Commercial Zone**

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 36A

34. **Part 36A C-8A Community Commercial A Zone**

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 36B

35. **Part 36B C-8B Community Commercial B Zone**

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 37

36. **Part 37 C-15 Town Centre Commercial Zone**

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO PART 38

37. Part 38 C-35 Downtown Commercial Zone

- Amend Section D. Density by deleting the entire section and replace with the following:

"1. For the purpose of *building* construction, in all areas described and outlined on the maps attached as Schedule F of this By-law, the maximum *density* shall not exceed a *floor area ratio* of 0.1 or *building* area of 300 square metres [3,230 sq. ft.] whichever is smaller. The maximum *density* of development may be increased to that prescribed in Sub-sections D.2 of this Zone if amenities are provided in accordance with Schedule G of this By-law.

2. In areas other than the ones in Sub-section D.1 of this Zone, the maximum *density* shall not exceed that prescribed in the following:

(a) The maximum *floor area ratio* shall not exceed 3.50 provided that no more than 67% of the developed floor area may be used as *multiple unit residential building.*

(b) Indoor *Amenity Space.* The space required in Sub-section J.3 of this Zone, is excluded from calculation of *floor area ratio* (FAR).

AMENDMENTS TO PART 39

37. Part 39 CHI Highway Commercial Industrial Zone

- In Section D. Density 1 delete:

"Neighbourhood Concept Plan and Infill"

Amendments to Part 40

38. Part 40 C-15 Town Centre Commercial Zone

- In Section D. Density 1 delete:

"Neighbourhood Concept Plan and Infill"

Amendments to Part 41

39. Part 41 CG-2 Combined Service Gasoline Station Zone

- In Section D. Density 1 delete:

"Neighbourhood Concept Plan and Infill"

Amendments to Part 42

40. Part 42 CTA Tourist Accommodation Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 44

41. Part 44 CPR Community Recreation Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 45

42. Part 45 CPG Golf Course Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 47

43. Part 47 IB Business Park Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 47A

44. Part 47A IB-1 Business Park 1 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 47B

45. Part 47B IB-2 Business Park 2 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 47C

46. Part 47C IB-3 Business Park 3 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 48

47. Part 48 IL Light Impact Industrial Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

Amendments to Part 48A

48. Part 48A IL-1 Light Impact Industrial 1 Zone

- In Section D. Density 1 delete:

  "Neighbourhood Concept Plan and Infill"

AMENDMENTS TO SCHEDULE F

- Insert new page immediately after Map 29. Area XXIX and insert the following:

"30. Area XXX Map of Surrey City Centre- See Schedule D, Map D.1 Surrey City Centre"

AMENDMENTS TO SCHEDULE G

Schedule G Amenity Requirements in Neighbourhood Concept Plan (NCP) and Infill Areas

- Delete Schedule G in its entirety and replace with:

Schedule G
Amenity Requirements for Areas in Schedule F of this Bylaw

Areas in Schedule F of this Bylaw		Uses	Contributions for the amenity categories of:				
			Police Protection	**Fire Protection**	**Library Materials**	**Park, Pathway & Facility Development**	**Total**
1.	Area I	**Residential** ($ per *dwelling unit*)	N/A	N/A	$125.07	$497.74	$622.81
		Non-Residential ($ per acre)	N/A	N/A	$500.34	$1,992.23	$2,492.57
2.	Area II	**Residential** ($ per *dwelling unit*)	$14.14	$200.15	$150.11	$970.60	$1,335.00
3.	Area III	**Residential** ($ per *dwelling unit*)	$65.16	$281.45	$146.58	$704.83	$1,198.02
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
4.	Area IV	**Residential** ($ per *dwelling unit*)	$65.16	$281.45	$146.58	$685.37	$1,178.56
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
5.	Area V	**Residential** ($ per *dwelling unit*)	$65.44	$281.45	$146.58	$833.94	$1,327.41
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37

Areas in Schedule F of this Bylaw		Uses	Contributions for the amenity categories of:				
			Police Protection	**Fire Protection**	**Library Materials**	**Park, Pathway & Facility Development**	**Total**
6.	Area VI	**Single Family** ($ per *dwelling unit*)	$11.06	$195.45	$119.86	$938.62	$1,264.99
		Multi-Family ($ per *dwelling unit*)	$11.06	$324.41	$119.86	$938.62	$1,393.95
		Non-Residential ($ per acre)	$44.29	$781.80	N/A	N/A	$826.09
7.	Area VII	**Residential** ($ per *dwelling unit*)	$65.15	$281.45	$146.58	$651.50	$1,144.68
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
8.	Area VIII	**Residential** ($ per *dwelling unit*)	$65.15	$281.45	$146.58	$254.02	$747.20
		Non-Residential ($ per acre)	$260.56	$1,125.80	N/A	N/A	$1,386.36
9.	Area IX	**Residential** ($ per *dwelling unit*)	$65.15	$281.45	$146.58	$851.86	$1,345.04
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
10.	Area X	**Residential** ($ per *dwelling unit*)	$65.15	$281.45	$146.58	$497.02	$990.20
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37

Areas in Schedule F of this Bylaw		Uses	Contributions for the amenity categories of:				
			Police Protection	Fire Protection	Library Materials	Park, Pathway & Facility Development	Total
11.	Area XIa	**Residential** ($ per *dwelling unit*)	N/A	N/A	N/A	$725.82	$725.82
	Area XIb	**Residential** ($ per *dwelling unit*)	$65.15	$281.45	$146.58	$999.73	$1,492.91
		Non-Residential ($ per acre)	260.66	$1130.39	N/A	N/A	$1,391.05
12.	Area XII	**Residential** ($ per *dwelling unit*)	N/A	N/A	$144.96	N/A	$144.96
		Non-Residential ($ per acre)	$257.76	$1,113.12	N/A	$3,406.46	$4,777.34
13.	Area XIII	**Residential** ($ per *dwelling unit*)	$65.15	$280.06	$145.86	$895.00	$1,386.07
		Non-Residential ($ per acre)	$259.28	$1,120.22	N/A	N/A	$1,379.50
14.	Area XIV	**Residential** ($ per *dwelling unit*)	$65.16	$281.45	$146.94	$1,387.75	$1,881.30
		Non-Residential ($ per acre)	$977.32	$4,221.76	N/A	$6,442.25	$11,641.33
15.	Area XV	**Residential** ($ per *dwelling unit*)	N/A	N/A	$143.69	N/A	$143.69
		Non-Residential ($ per acre)	$255.46	$1,103.58	N/A	$2,923.11	$4,282.15

Areas in Schedule F of this Bylaw		Uses	Contributions for the amenity categories of:				
			Police Protection	**Fire Protection**	**Library Materials**	**Park, Pathway & Facility Development**	**Total**
16.	Area XVI	**Residential** ($ per *dwelling unit*)	$63.76	$275.38	$143.42	$826.58	$1,309.14
		Non-Residential ($ per acre)	$254.96	$1,101.58	N/A	N/A	$1,356.54
17.	Area XVII (Plan Area)	**Residential** ($ per *dwelling unit*)	N/A	N/A	$143.42	N/A	$143.42
		Non-Residential ($ per acre)	$2,638.45	$1,101.58	N/A	$254.96	$3,994.99
	Area XVII (Infill Area)	**Residential** ($ per *dwelling unit*)	$62.74	$275.38	$143.42	N/A	$481.54
		Non-Residential ($ per acre)	N/A	N/A	N/A	$2,638.45	$2,638.45
18.	Area XVIII (NCP Area)	**Residential** ($ per *dwelling unit*)	$64.91	$281.36	$145.79	$876.33	$1,368.39
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
	Area XVIII (Transit Oriented Area)	**Residential** ($ per *dwelling unit*)	$64.91	$281.36	$145.79	$1,291.19	$1,783.25
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37

Areas in Schedule F of this Bylaw		Uses	Contributions for the amenity categories of:				
			Police Protection	Fire Protection	Library Materials	Park, Pathway & Facility Development	Total
19.	Area XIV	**Residential** ($ per *dwelling unit*)	$64.91	$281.36	$145.79	$1,018.92	$1,510.98
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
20.	Area XX	**Non-Residential** ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
21.	Area XXI	**Residential** ($ per *dwelling unit*)	$65.16	$281.46	$146.58	$1,280.71	$1,773.91
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
22.	Area XXII	**Residential** ($ per *dwelling unit*)	$64.90	$281.36	$145.79	$879.77	$1,371.82
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
23.	Area XXIII	**Residential** ($ per *dwelling unit*)	$64.90	$281.36	$145.79	$1,104.21	$1,596.26
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
24.	Area XXIV	**Residential** ($ per *dwelling unit*)	$65.16	$281.46	$146.58	$1,231.35	$1,724.55
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37

Areas in Schedule F of this Bylaw		Uses	Contributions for the amenity categories of:				
			Police Protection	**Fire Protection**	**Library Materials**	**Park, Pathway & Facility Development**	**Total**
25.	Area XXV	**Residential** ($ per *dwelling unit*)	$65.16	$281.46	$146.58	$1,170.20	$1,663.40
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
26.	Area XXVI	**Residential** ($ per *dwelling unit*)	$65.16	$281.46	$146.58	$1,142.24	$1,635.44
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
27.	Area XXVII	**Residential** ($ per *dwelling unit*)	$65.16	$281.46	$146.58	$1,344.76	$1,837.96
		Non-Residential ($ per acre)	$260.56	$1,125.81	N/A	N/A	$1,386.37
28.	Area XXVIII	**Residential** ($ per *dwelling unit*)	$65.16	$281.46	$146.58	$1,226.06	$1,719.26
		Non-Residential ($ per acre)	N/A	N/A	N/A	N/A	N/A
29.	Area XXIX	**Residential** ($ per *dwelling unit*)	$65.16	$281.46	$146.58	$1,562.61	$2,055.81
		Non-Residential ($ per acre)	$260.65	$1,125.83	N/A	N/A	$1,386.48

Area in Schedule F of this Bylaw		Uses	Contributions for the amenity categories of:					
			Park, Pathway & Facility Development	Library Materials	Fire Protection	Police Protection	Under-grounding Utilities	Total
30.	Area XXX	**Residential-** ***Single Family Dwelling*** **and** ***Duplex:***						
		($ per *dwelling unit)*	$1,554.00	$146.58	$281.46	$65.16		$2,047.20
		plus						
		($ per sq. ft. of *buildable area)*					$1.66	$1.66
		All Residential except ***Single Family Dwelling*** **and** ***Duplex:***						
		(a) Bachelor and Studio ($ per *dwelling unit)*	$1,207.00	$43.97	$84.44	$19.55		$1,355.00
		plus						
		($ per sq. ft. of *buildable area*)					$1.66	$1.66
		(b) One Bedroom ($ per *dwelling unit)*	$1,375.00	$58.63	$112.59	$26.06		$1,572.28
		plus						
		($ per sq. ft. of *buildable area)*					$1.66	$1.66
		(c) Two + Bedrooms ($ per *dwelling unit*)	$1,554.00	$73.29	$140.73	$32.58		$1,800.60
		plus						
		($ per sq. ft. of *buildable area)*					$1.66	$1.66
		Non-Residential						
		($ per acre)	N/A	N/A	$1,125.83	$250.56		$1,125.83
		($ per sq. ft. of *buildable area)*	N/A	N/A			$1.66	$1.66

1. The following will apply to the payment of contributions described in the table above:

   (a) For all residential single family and duplex zones, the contributions must be paid before final execution of the subdivision plan by the Approving Officer.

   (b) For all other residential uses in zones other than those with single family and duplex, the contributions must be paid before building permit issuance.

   (c) For non-residential uses the contributions must be paid before building permit issuance.

2. The above rates will be adjusted annually by the Average Annual Consumer Price Index for Vancouver based on the following formula:

   Current Year Rate = Previous Year Rate x (1 + Average Annual Consumer Price Index for Vancouver for the Previous Year)

Appendix "III"

ZONING BY-LAW AMENDMENTS RELATED TO ARTIST STUDIO & CULTURAL USES

Proposed Amendments to
Surrey Zoning By-law, 1993, No. 12000, as amended

The following amendments are proposed to Surrey Zoning By-law, 1993, No. 12000, as amended:

AMENDMENTS TO PART 1 DEFINITIONS

1. **City Centre**

   - Delete the definition of "City Centre" and replace it in its entirety with the following:

     "City Centre
     means the area as shown on map in Schedule D, Map D.1 Surrey City Centre"

2. **Artist Studio**

   - Insert a definition for "Artist Studio" immediately following the definition of "Arterial Highway", as follows:

     "Artist Studio
     means the use of premises for the production of dance, live music, creative writing, painting, drawing, pottery or sculpture, video, moving or still photography, none of which involves amplified sound."

3. **Cultural Uses**

   - Delete the entire definition and replace with the following:

   "means a facility which provides for social enlightenment and includes museums, art galleries, and *artist studios*."

AMENDMENTS TO PART 36

4. **Part 36 C-8 Community Commercial Zone**

   - Amend Section B. Permitted Uses by inserting the following:

     "17. *Cultural Uses"*

AMENDMENTS TO PART 37

5. **Part 37 C-15 Town Centre Commercial Zone**

- Amend Section B. Permitted Uses by inserting the following:

"16. *Cultural Uses"*

AMENDMENTS TO PART 38

6. **Part 38 C-35 Downtown Commercial Zone**

- Amend Section B. Permitted Uses by inserting the following:

"16. *Cultural Uses"*

AMENDMENTS TO PART 39

7. **Part 39 CHI- Highway Commercial Industrial Zone**

- Amend Section B. Permitted Uses, sub-section 17 (k), by deleting the word "and" after *Child care centres;*

- Amend Section B. Permitted Uses, sub-section 17 (l), by renumbering *Accessory uses* to:

"(m) *Accessory uses*"

- Amend Section B. Permitted Uses, sub-section 17 by inserting the following:

"(l). *Cultural Uses;* and"

Appendix "IV"

REVISED POLICY NO. O-48

City of Surrey Policy

No. O-48

Policy Title:	**RELAXATION OF THE PROVISION OF INDOOR AND OUTDOOR AMENITY SPACE IN MULTIPLE RESIDENTIAL DEVELOPMENTS**
Approval Date:	**(insert date)**
History:	**28 OCT 2013 (RES.R13-2276)** **26 JUNE 2006 (RES.R06-1471)** **26 FEB 2001 (RES.R01-406)**
Department:	**PLANNING & DEVELOPMENT**

Policy Statement

In accordance with the *Local Government Act*, a local government can vary Zoning By-law requirements through the issuance of a Development Permit.

The City will consider a request from the developer of a project containing multiple unit residential dwellings to reduce or eliminate the required indoor and outdoor amenity space requirements, if the developer provides an acceptable alternative.

Acceptable alternatives may include:

1. A cash-in-lieu contribution to the City for the purpose of constructing public recreational spaces in the same community as follows:

   (a) A cash-in-lieu contribution in an amount of $1,200 per dwelling unit will be considered adequate to satisfy the indoor amenity space requirement of the Zoning By-law;

   (b) A cash-in-lieu contribution in the amount of $600 per dwelling unit will be considered adequate to satisfy the outdoor amenity space requirement of the Zoning By-law; and

(c) When a developer chooses to make a cash-in-lieu contribution under this policy, the contribution is to be made prior to the Development Permit being considered for approval by City Council; and/or

2. In City Centre, (the area shown in map D.1 of Surrey Zoning By-law 12000), a maximum of 0.75 square metres [8 sq. ft.] per dwelling unit of the required outdoor amenity space may be provided as public outdoor space as follows:

(a) The public outdoor space may be located within setbacks;

(b) The public outdoor space shall be designed for the use of the public and may include plazas, seating, decorative pavers, water features, high quality landscaping and public art, and found acceptable to the City; and

(c) The public outdoor space shall be secured by a statutory right-of-way.

Appendix "V"

Public and Stakeholder Engagement & Consultation Summary

Focus Groups, Surveys & Interviews

- Between January and April 2012, survey questionnaires and focus groups with residents, employees, and students in City Centre were used to determine opinions about what contributes to a vibrant downtown.

- Follow up interviews were held with the Downtown Surrey Business Improvement Association members, business owners, and residents living in City Centre.

Public Open Houses and Meetings

- On November 25, 2013 a Public Open House was held to receive feedback on preferred locations for Food Cart in City Centre.

- On November 9, 2015 a Stakeholder Meeting was held regarding preferred location options for a future park in the southern area of the City Centre Plan.

- On March 9, 2016 a Public Open House was held at the City Centre Library.

Business and Development Community Meetings

- On June 28, 2016 and September 19, joint meetings with the Urban Development Institute and Development Advisory Committee were held to provide an update on the City Centre financing and implementation strategy.

Council Advisory Committees

- On October 28, 2015 a meeting with the Surrey Heritage Advisory Commission was held to provide an update on a supplementary Heritage Study that examined the Mid-Century Modern influence in City Centre.

- On March 21, 2016, meeting with the Transportation and Infrastructure Committee, in order to receive feedback on cycle tracks strategy including incorporation of cycle tracks into City Centre standards, achieving cycle tracks along LRT corridors, and evaluation of new arterial and collector road construction projects as potential sites for cycle tracks.

- On October 18, 2016 a meeting with the Transportation and Infrastructure Committee in order to receive feedback on strategy options for funding the acquisition of key roads in City Centre.

- On September 7, 2016 a presentation was made at the Social Policy Advisory Committee meeting to provide an update on the City Centre Plan and policies related to housing diversity and tenure.

- On September 21, 2016 a presentation was made at the Parks Recreation and Sports Tourism Committee meeting to provide an update on the City Centre Plan and related policies to Parks and Community Facilities Infrastructure

- On October 26, 2016 a presentation was made to the Environmental Sustainability Advisory Committee to provide an update on the City Centre Plan and related drainage, parks and green space policies.

- On November 15, 2016 a presentation was made to the Cultural Development Advisory Committee to provide an update on the City Centre Plan and related Culture and Public Art components.

Design & Visioning Workshops

- In October, 2011 a workshop was held with urban design experts, Allan Jacobs and Elizabeth MacDonald from University of California, Berkeley to develop a design solution for King George Boulevard. The workshop components included a staff mini-design charette and a follow up design session with Jacobs and MacDonald.

- During the time between 2014 to 2016, meetings with Translink, SFU, SCDC –bus layover and transit couplet concept.

- On May 22, 2013 and October 19 2015 workshops were held with city staff to establish and further refine an Arts & Culture vision for the downtown.

- In 2015 a visioning workshop and ongoing meetings in 2016 were held with SFU to examine the expansion needs of the university in relation to the City Centre vision and the evolution of a University Precinct in the City Centre.

Community Festivals & Forums

- A temporary design installation to activate public space in the City Centre was initiated with the "Parkit" program in May 2012. The goal of the program was to create a temporary urban park in order to engage the community in placemaking and to activate empty public space in the City Centre. This has evolved into an annual Community Design Challenge that has provided unique installations to transform parking lot spaces adjacent to the North Surrey Recreation Centre into an engaging public space.

- On March 2 2013, the "Imagine Surrey" forum was held at the City Centre Library to showcase key developments of the City Centre Plan and the plan for future development. The event included presentations from key professionals and city staff as well as display boards showing images and locations of future development in the City Centre.

- Other public engagement opportunities have included display booths at city festivals and special events. To showcase current and future development projects in City Centre Plan area, interactive 3-D displays, and presentations have been used at Party for the Planet on April 26, 2014 and Doors Open Events in 2014 and 2015.

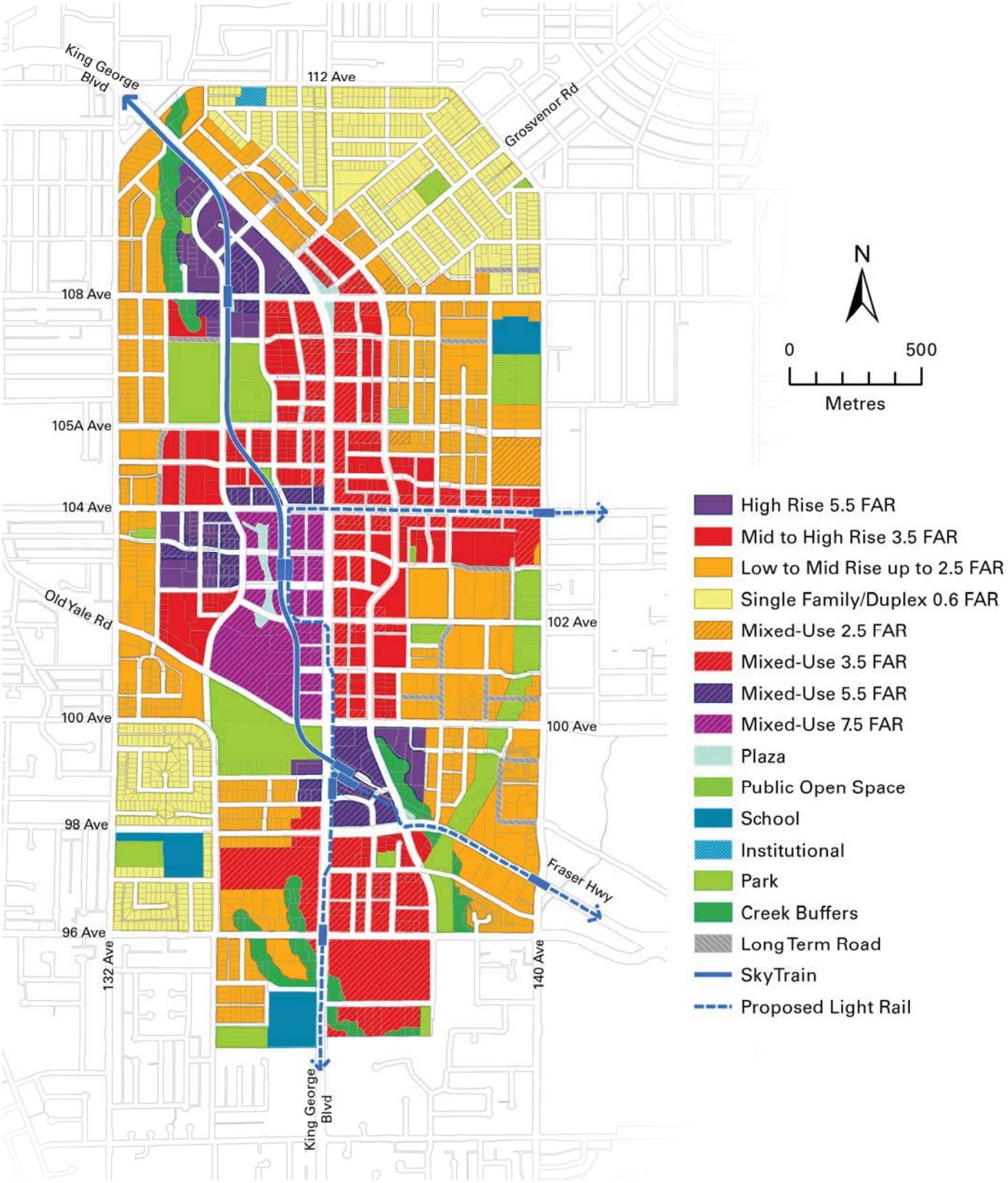
- On October 1, 2016 a "Then & Now" display was presented as part of the Five Year Library Anniversary Event. The focus was on City Centre developments that have been built over the past 5 years.

City Centre Walking Tours

- Over the past five years, city staff has led over 30 walking tours of the City Centre designed for various groups including residents, students, and industry & health professionals. These tours have highlighted the history, the architecture, and land use, transportation plans for the future of development in the City Centre.

Appendix "VI"

Land Use and Density Concept



Appendix "VII"

Mixed Use Ground Floor Interface

Appendix "VIII"

Road Network Concept

Appendix "IX"

Transit Within City Centre

Appendix "X"

Parks & Open Space Concept

Appendix "XI"

Alternative Park Locations Examined for the Medical District

Appendix "XII"

Secondary and Elementary School Boundaries for City Centre

Appendix "XIII"

Neighbourhoods and Districts in City Centre