ABBEY RIDGE

LOCAL AREA PLAN LAP

CITY OF SURREY

Abbey Ridge
Local Area Plan

Planning and Development &
Engineering Departments

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

APPROVED BY COUNCIL FEBRUARY 6, 2017

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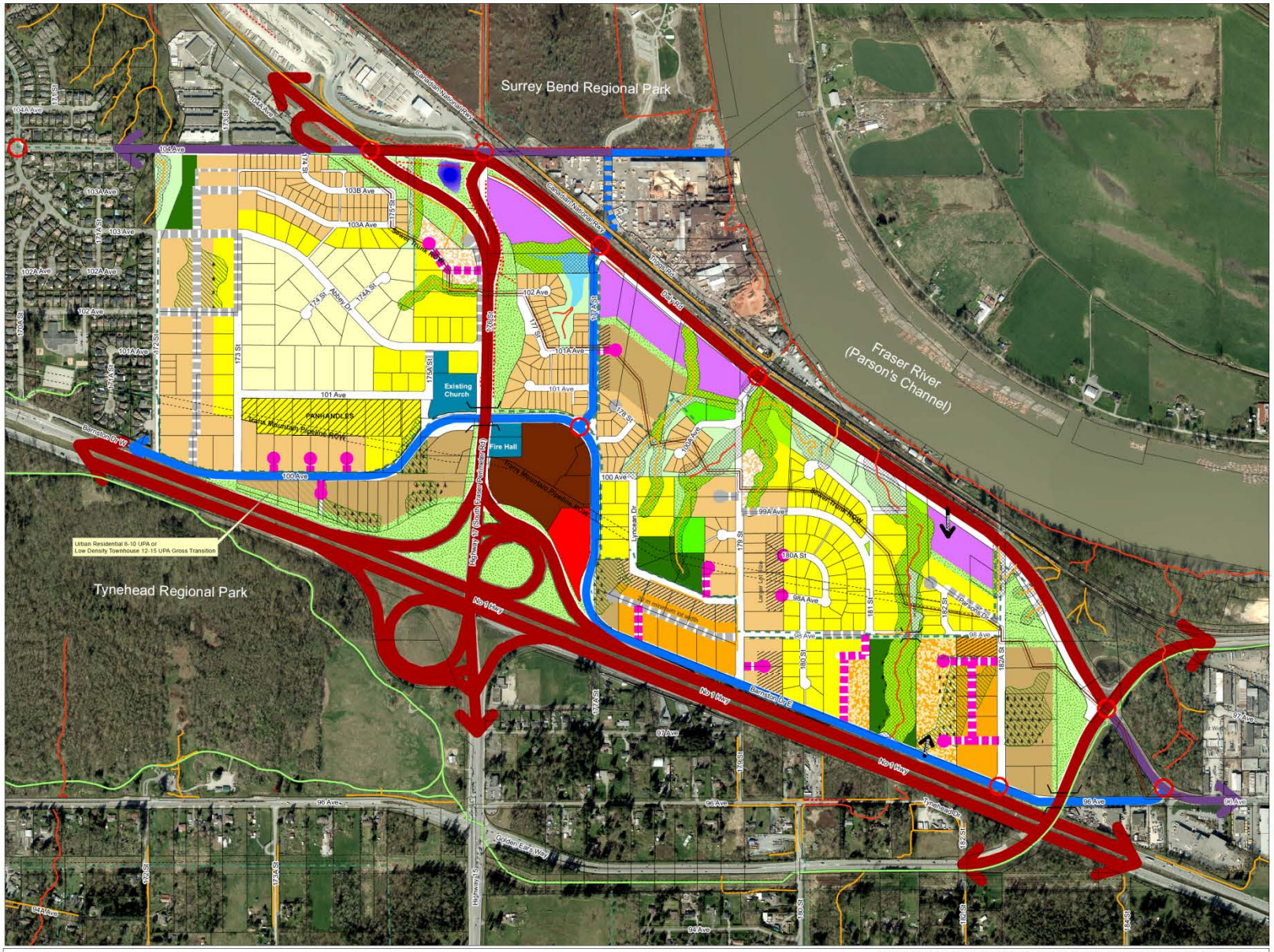

Abbey Ridge
Stage 2 - Land Use Concept Plan

Approved by Council at it's Regular Council Meeting of February 6, 2017 - Resolution RES R17-383

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City of Surrey Planning and Development Department

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LEGEND

Land Use Designations

- Acreage Residential 1-2 UPA
- Suburban Residential 2-4 UPA Gross
- Urban Transition 4-5 UPA
- Low Density Cluster 4-6 UPA Gross
- Single Family Residential 4-6 UPA
- Medium Density Cluster 10-12 UPA Gross
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- Signalized Intersection
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- Stream Class A
- Stream Class B
- Buffer of Fishclass A and AO 30m
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MAPS

TABLES

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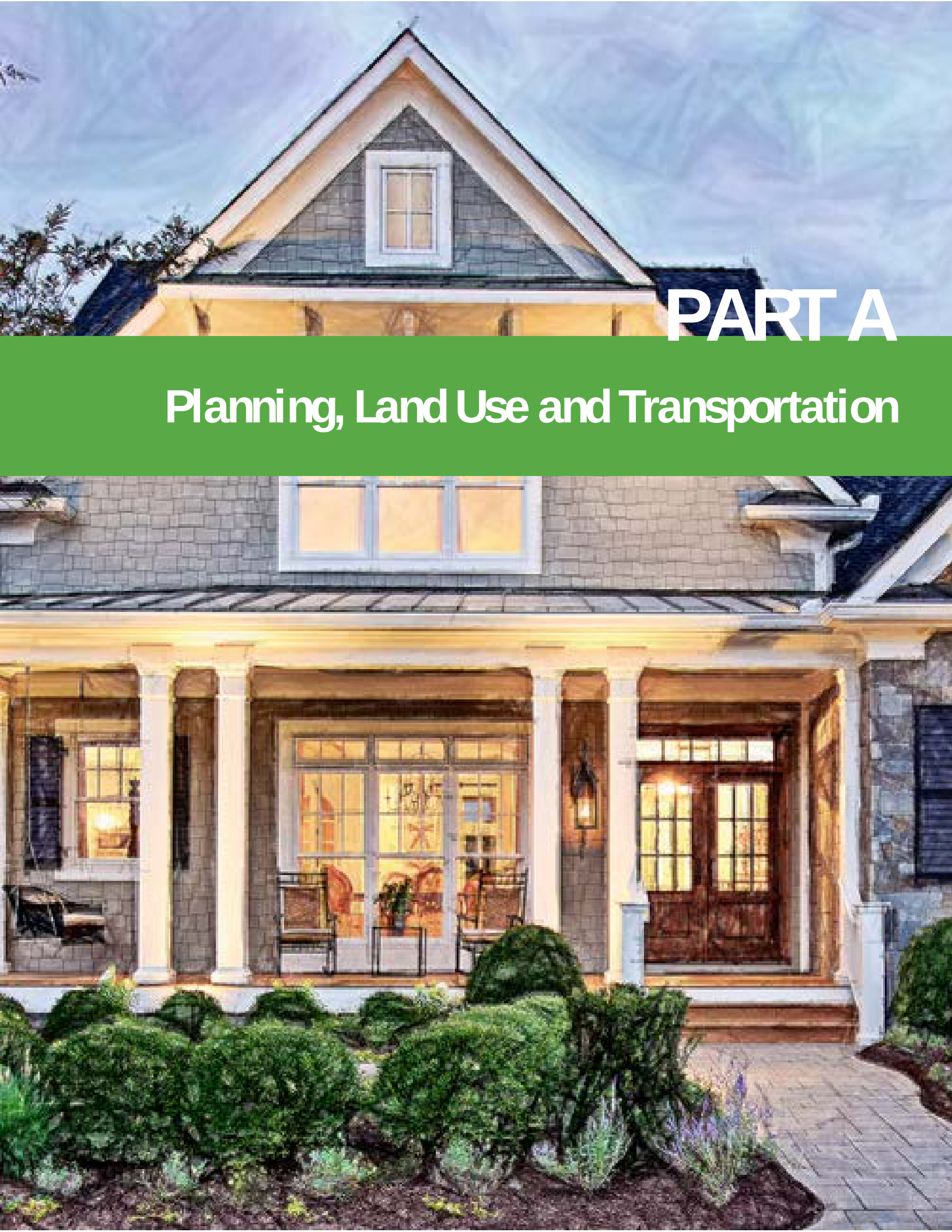


PART A

Planning, Land Use and Transportation

SECTION 1
Background and Context

1
BACKGROUND AND CONTEXT

The Local Area Plan and Land Use Concept for the Abbey Ridge area will guide future Official Community Plan ("OCP") and zoning bylaw amendments, as well as confirm many existing land use designations within the Neighbourhood.

The Abbey Ridge area has not been the subject of a secondary plan such as a General Land Use Plan or Neighbourhood Concept Plan or Local Area Plan; and is the only area within the Fraser Heights area of Surrey, to be part of a comprehensive secondary land use planning process.

The intent of the Abbey Ridge Local Area Plan is to:

1. Provide a level of certainty for residents, land owners and developers regarding the future character of the area;
2. Assist the City in responding to development applications and inquiries in the Abbey Ridge neighbourhood;
3. Ensure a comprehensive and coordinated land use, transportation, environmental, servicing, and financial strategy;
4. Ensure adequate infrastructure such as, parks, roads and utilities to support the land uses anticipated in the neighbourhood; and
5. Ensure broad neighbourhood consultation on the future of the area.

1.1 PLAN INITIATION AND PLANNING CONTEXT

On March 23, 2015 Council authorized City staff to initiate a land use planning and community consultation process for the East Fraser Heights area (now named Abbey Ridge), in response to increased development interest in the area, and to address servicing and community consultation issues.

The purpose of the planning process was to develop a coordinated land use concept and servicing strategy for the area.

Local Area Plan Intent

A Local Area Planning process addresses several issues for the Abbey Ridge Neighbourhood, including:

1. Identify appropriate land uses and densities to create an attractive and sustainable community, including particular consideration of transitions and the interface between existing neighbourhoods and new development;

2. Ensure Environmental conservation and biodiversity values are provided for through identifying key natural assets and developing a plan for conservation;

3. Providing a formal review of School capacities related to anticipated future growth;

4. Provide for Parks, recreation and open space needs related to current and future residential growth;

5. Provide for a coordinated street network that ensures pedestrian, cycling, transit and vehicular connectivity and access into and through the LAP area, and that also addresses issues related to traffic safety and which minimizes traffic impacts on existing neighbourhoods;

6. Ensure a coordinated servicing strategy (sanitary, water, drainage and other utilities) to ensure efficient and equitable of delivery of infrastructure;

7. Provide a mechanism for providing community amenities and benefits related to public needs imposed by development; and

8. Consult with the community in a comprehensive manner, rather than solely on individual development applications.

1.2 PLANNING AND CONSULTATION PROCESS

On June 25, 2015 a kick-off public meeting was held with property owners and the general public living within and around the East Fraser Heights area to provide an update on the status of the Local Area Planning process. The purpose of this first public consultation meeting was to:

- **provide background on the reasons for conducting the plan;**
- **introduce the City's planning team;**
- **discuss how the planning process will take place;**
- **provide initial draft results of an environmental study recently conducted in the area; and**
- **allow comments and suggestions about a future Land Use Concept and vision for the neighbourhood.**

Public Consultation Process

Stage I Kick-Off Public Open House

There were 132 people who attended the first public open house held at Fraser Heights Recreation Centre. The City received 31 completed feedback forms following the meeting, representing comments from 25 properties within the LAP area and within approximately 1.3 kilometres of the LAP area.

Environmental Study

On July 29, 2015 Phoenix Environmental Services Ltd completed an Environmental Assessment and Tree Study of the plan area. The Environmental Assessment and Tree Study provided a baseline environmental context as a first step in the development of a Land Use Concept for the area. The complete Environmental Study can be found in Appendix A-2.

Fraser Heights Community Association Consultation

On September 23, 2015 staff attended and presented two draft land use concept options to the Fraser Heights Community Association to provide the association members with an opportunity to comment on draft plans for the area.

Several comments, and recommendations were provided, and refinements were made to the working draft land use concept options in order to develop a preferred land use concept to present to the public.

Naming the Neighbourhood

The unique sense of identity, place, and community of a neighbourhood can be enhanced by a name that is associated with the history, heritage or a distinguishing feature of that area.

During the Stage I public open house, residents were asked to identify a preferred name for the LAP area from a list of four potential names that was proposed by staff.

Based on feedback from the public meeting, "Abbey Ridge" was selected as the proposed LAP name for the area. The existing Abbey Drive located within an existing suburban area of the LAP was significant in relation to this name, and distinguished this neighbourhood within the larger Fraser Heights community to the west.

Stage II Servicing Strategy Public Open House

On October 18, 2016 a final public open house was held with property owners and the general public living within and around the Abbey Ridge area to provide the draft Stage II servicing plans and financial strategy for the Local Area Plan, and provides an opportunity for comment on modifications to the Stage 1 land use concept plan.

56 people attended the Abbey Ridge LAP Public Open House which was held at Fraser Heights Secondary School.

1.3 BOUNDARIES AND GEOGRAPHY

The Abbey Ridge Local Area Plan ("LAP") comprises of 184 hectares (455 acres) of land and is generally bounded by Highway No. 1 to the south, 172 Street to the west, Highway 17, Daily Road and the CN Railway to the north, and Golden Ears Way to the east, as illustrated in Map 1.

The LAP is bisected north to south by the Big Bend major drainage catchment area to the west of 176 St. (Highway 15) and the large Port Kells drainage catchment area to the east of 176 Street.

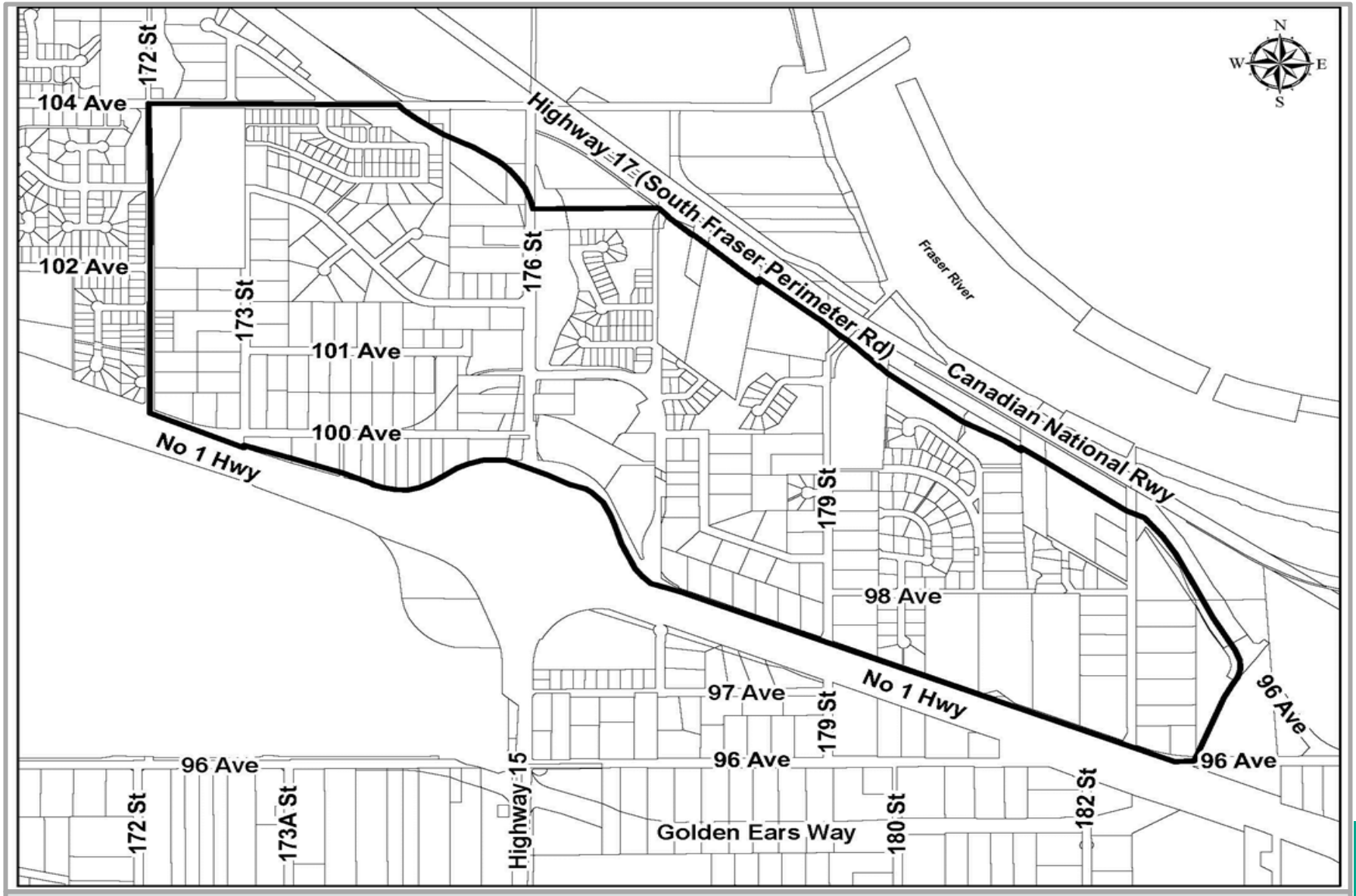
Environmental Characteristics

The area is characterized by land that slopes moderately towards the north, with excellent views over the Fraser River to the North Shore Mountains. A number of Class A and Class B fisheries habitat watercourses and associated riparian areas bisect the area and flow north towards the Fraser River. A Green Infrastructure Corridor has also been identified in the Biodiversity Conservation Strategy for protection.

The area also lies between two large natural area parks – Surrey Bend Regional Park to the north, across the South Fraser Perimeter Road and the CN rail corridor, and Tynehead Regional Park to the south, across Highway 1.

As part of the LAP process Phoenix Environmental Consultants were retained to complete the study with recommendations. This study was completed in June of 2015, and identified several significant environmental features within the LAP area, including Leoran Brook and several other Class A and Class B fisheries watercourses that receive groundwater base flows from springs along the escarpment and ravine slopes.

There are also numerous Class C drainage watercourses and ditches along property boundaries and roads within the LAP.



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Map 1 - Abbey Ridge Local Area Plan Boundaries

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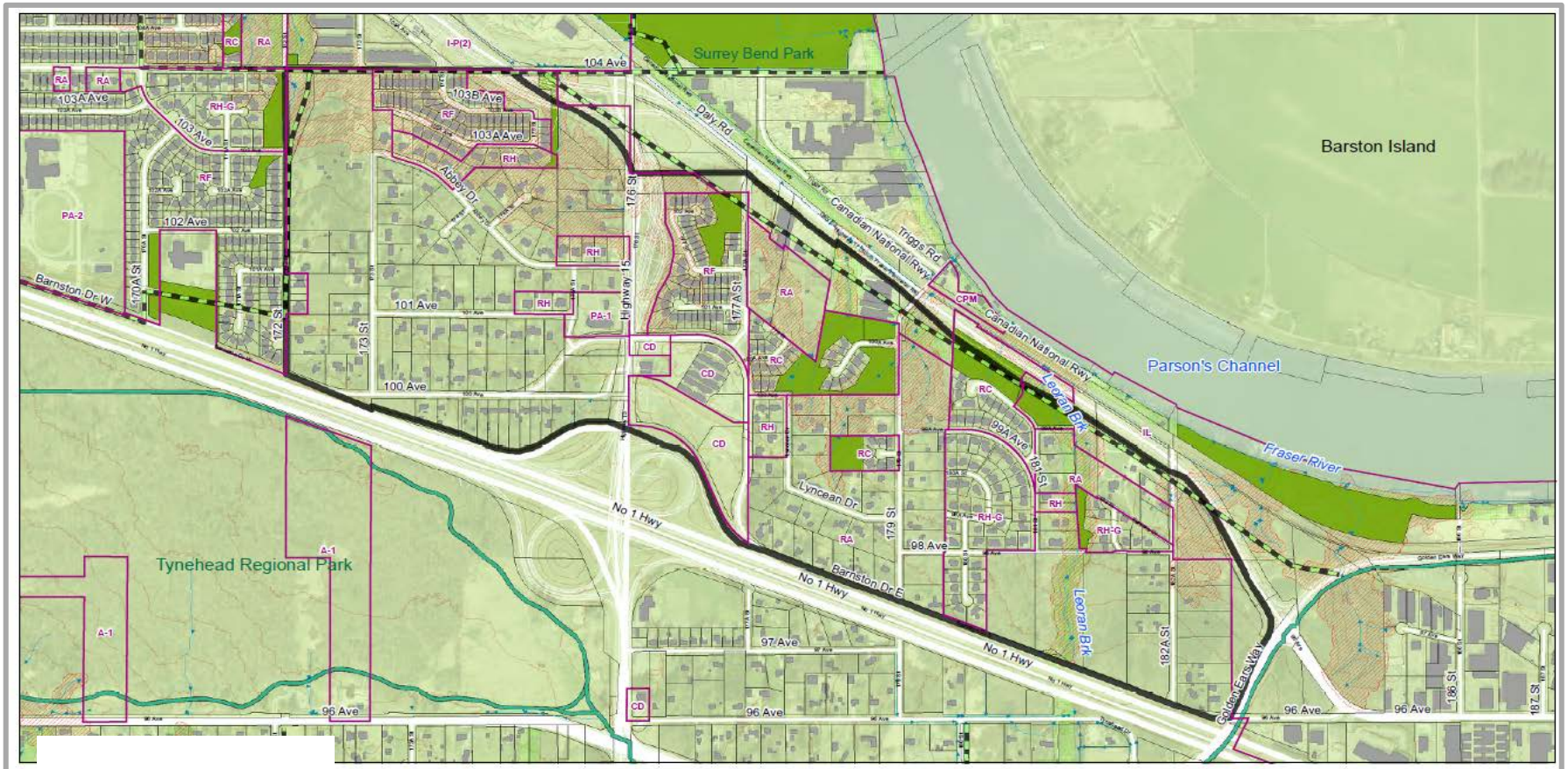

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Map 2 - Abbey Ridge Local Area Plan Context Map

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1.4 CURRENT LAND USES & POPULATION

The majority of the Abbey Ridge LAP neighbourhood is currently occupied by residential uses.

The residential neighbourhood is made up of a mix of large suburban properties, undeveloped and rural lots and pockets of higher-density urban subdivisions and developments that have been approved on a case-by-case basis over the last 5 – 10 years.

Existing Land Uses

The majority of the area is designated Suburban in the Surrey Official Community Plan (" OCP"), with areas of Industrial designation in the north and east areas adjacent to Highway 17. The Suburban areas include,:

- 140 properties zoned One Acre Single Family Residential (RA) Zone;
- 25 properties zoned Half-Acre Single Family Residential (RH) Zone;
- 54 properties zoned Gross Density Half-Acre Single Family Residential (RH-G) Zone;
- 35 properties zoned Cluster Residential (RC) Zone; and
- 1 property zoned Assembly Hall 1 (PA-1) Zone, occupied by a church

Existing Residential Units & Population

There are approximately 522 residential dwelling units existing in Abbey Ridge LAP area, with a population of approximately 1,767 people. This works out to approximately one residential unit and 3.9 persons per acre.

It is also estimated that there a currently some 135 secondary suites within the existing residential areas with an estimated population of approximately 258. In total, the existing population for the area is estimated to be approximately 2,500 including residents in secondary suites.

Existing Parks

There are currently no active parks within the LAP area, however, a number of the cluster-zoned single-family neighbourhoods (RC or RH-G zones) include parkland areas that were conveyed to the City upon rezoning. These lands typically include riparian areas or other undevelopable lands, and total approximately 18.7 acres (7.7 hectares).

Two large regional parks are located adjacent to the LAP area. Surrey Bend Regional Park is primarily a natural area, with limited trail development along the Fraser River shoreline and a new playground and picnic area. Tynehead Regional Park is a large and diverse park with a mix of forests and fields, a fish hatchery, parking areas and a paved perimeter trail. The LAP area connects with Tynehead Regional Park via a pedestrian overpass across Highway 1 at 168 Street.

Schools

There are no schools located within the Abbey Ridge LAP area. Children living in the area fall within the Bothwell Elementary School catchment. This school is located along 102 Avenue, just to the west of the study area and, according to School District No. 36 staff, has current capacity for an additional 150 students.

The local public Secondary School is Fraser Heights Secondary, which is currently at capacity and includes portable classrooms. There is also a large independent school, Pacific Academy, located west of the study area at the corner of Barnston Drive and 168 Street.

Public Facilities

City of Surrey Fire Hall #5 is located on Barnston Drive, immediately east of Highway 15/176 Street.

Public Assembly Uses

A Korean Central Presbyterian Church is located 10110 175 a St, at the intersection of Highway 15/176 street and 100 Avenue.

1.5 OPPORTUNITIES AND CONSTRAINTS

Given the increased development interest and pressures, and the significant transportation and servicing related challenges and changes occurring in the area, a Land Use Concept Plan for the Abbey Ridge area ensures a coordinated plan which guides future development, and ensures appropriate neighbourhood consultation for envisioning the future Neighbourhood character of the Abbey Ridge area.

The Land Use Concept Plan, and LAP servicing and financial strategy are grounded in an overall vision and planning objective direction for the area, to ensure land use changes occur in a proactive and projected manner, rather than through incremental and piecemeal responses to individual development applications.

Main Planning Issues

Transportation

The street network in the LAP area is relatively disconnected due to the limited-access Provincial highways that surround and bisect the study area and ravines that limit the connectivity of local street networks. There is limited and disconnected pedestrian and cycling infrastructure in the area and there is no transit service available at this time.

The construction of the South Fraser Perimeter Road (Highway 17) and improvements to the Highway 1/Highway 15 interchange over the past few years have changed the character of the area and affected vehicular access into the existing neighbourhoods and between the western and eastern parts of the study area. While the major Provincial highways have made this area more readily accessible to and from other parts of the region, these highways also limit access points into parts of the neighbourhood.

Future connections to the Golden Ears Way Connector will address this issue to a degree, but connectivity across the area will remain a challenge.

Sanitary Sewer

The study area is currently serviced by a 600 mm to 750 mm diameter sanitary trunk sewer (known as the Big Bend Trunk) that traverses the hillside from east to west through the study area. The Big Bend Trunk captures sanitary flows from the southern portions of the study area, as well as pumped flows from the Port Kells Sanitary Pump Station (located at 98 Avenue and 190 Street) which services the Port Kells industrial area to the east. The trunk sewer discharges to the Big Bend Sanitary Pump Station at 176 Street and 104 Avenue. This pump station pumps sanitary flows via forcemain to Metro Vancouver's North Surrey Interceptor at 173 Street and 104 Avenue. Most of the properties north of the Big Bend Trunk are not serviced by the City's sanitary sewer system due to topographical constraints; instead, existing buildings in this area rely on private, on-lot septic field systems.

Several sections of the Big Bend Trunk have been identified as having capacity constraints under current flow conditions, including several sections east of 179 Street. Further, two sections of the trunk sewer west of 179 Street will experience capacity constraints in the near future. Limited upgrade works have been completed to date to address the capacity constraint issues. Some of the constrained trunk sewer sections traverse existing subdivisions, which may pose a challenge when implementing future upgrades.

The Big Bend Sanitary Pump Station does not have sufficient capacity to accommodate the projected increase in flows under future development conditions. Station upgrades will be required to accommodate future development and/or infill densification in the catchment area.

However, undertaking station upgrades may be challenging due to the station's elevation (approximately 3 metres geodetic) and proximity to the Fraser River floodplain. Currently, the station has the potential to flood during freshet conditions (roughly corresponding to a 10 year return period). The City's long term strategy is to relocate the Big Bend Sanitary Pump Station to a higher elevation.

Water

Under current conditions, some parts of the study area are serviced by the municipal water system, with the remaining areas serviced by private groundwater wells. In order to accommodate the proposed development in the study area, the municipal water system needs to be expanded and enhanced. Water supply to the area is currently provided by a 525 mm diameter feeder main on 96 Avenue, which is supplied by a direct connection to Metro Vancouver's transmission main. This feeder main does not have the capacity to support future development conditions in the study area; however, a secondary water source could be provided via the Whalley Reservoir at 14619 - 104A Avenue and its associated feeder main network.

Topographical conditions will require that two separate pressure zones be established for the study area. The majority of the study area is located within the lower pressure zone (90m). A 400mm feeder main, which has already been partially constructed and connected to the existing pressure reducing station at Cherryhill Court, would need to be extended to supply the 90m zone.

A network of distribution mains would also be required from this feeder main to service the study area and improve network connectivity. Due to its higher elevation, the southwestern portion of the study area is located within the high pressure zone (135m). Currently, there is no municipal water system in this area. The proposed feeder main identified in the Anniedale-Tynehead NCP could be used to provide water supply to this portion of the study area. A network of distribution mains would also be required.

Drainage

Based on topography and the existing drainage network, the LAP area is divided into two major catchments at 176 Street. Areas west of 176 Street drains to watercourses within Surrey Bend Regional Park (Metro Vancouver), while areas east of 176 Street drain to an industrial area on the shoreline of the Fraser River. Both of these catchments pass under the CN Railway via culvert crossings, which may be undersized for future development conditions. Existing drainage infrastructure consists of a combination of roadside ditches and storm sewers, which outfall to several Class A and B watercourses. The watercourses have well-defined channels and generally drain northeast towards the Fraser River. Most of these watercourses have previously identified erosion concerns.

The northern portion of the study area is within the Fraser River floodplain and is not protected by a dyke. Improvements may be required in this area to support future development.

Stormwater management, drainage infrastructure improvements and on-lot source controls will be required to support future development, mitigate upland creek erosion and flooding issues in the lowland portions of the LAP area, and ensure existing habitat values and base flows in the watercourses are not compromised.

Environment

Surrey's Biodiversity Conservation Strategy identifies a Green Infrastructure Corridor in the LAP area along Leoran Brook north to the Fraser River and east towards Surrey Bend Regional Park. This corridor is intended to be secured through the development process, to provide wildlife passage from the Fraser River to the Anniedale and Tynehead Biodiversity Hubs.

Kinder Morgan Trans-Mountain Pipeline

The existing Kinder Morgan Trans-Mountain pipeline transverses the LAP area. The Pipeline corridor consists of an 18.6 metre right-of-way. In the late 1990s, the Utilities Commission placed a 30 metre approval zone on either side of the pipeline right-of-way, with all land owners requiring permissions to do construction works on their properties in the approval zone. The approval zone was established in an effort to ensure the pipeline was not affected by adjacent works. The pipeline corridor and approval zone will need to be considered when making land use and servicing decisions for the area.

Kinder Morgan Trans-Mountain Pipeline is also planning to twin their infrastructure in this area. Due to the development that has already occurred adjacent to the existing alignment, the company is currently proposing to install the new pipeline near the base of the escarpment adjacent to Daly Road. The alignment of the new pipeline will also impact development in the LAP area. At this time, the corridor under investigation by Kinder Morgan and presented to the Utilities Commission should be considered in the land use planning for the area.

Development Applications

A number of development applications have been received by the City, seeking to develop residential areas at urban densities that involve an OCP amendment to Urban, Multiple Residential or Commercial designations.

These applications amended the OCP from suburban to urban, and include a total of 123 properties zoned Single Family Residential (RF) Zone in three locations, and the Multiple Residential and Commercial areas encompassing a single large development site zoned Comprehensive Development (CD) permitting the construction of up to 80 townhouse units and up to 435 units in six low-rise apartment buildings along with neighbourhood commercial space.

The build-out of the adjacent Fraser Heights west neighbourhoods, the improvement of access to the area brought by the South Fraser Perimeter Road, the excellent views available and the general shortage of serviceable lands for new single-family development in the Metro Vancouver region are cited as reasons for this development interest.

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SECTION 2
Vision and Planning Objectives

2
VISION AND PLANNING OBJECTIVES

To develop a neighbourhood vision for the Abbey Ridge LAP, residents and stakeholders where asked what the neighbourhood was like before, what it is like currently, and what they want the neighboured to be like in the next five to twenty five years. A draft vision statement was then created based on the key words and feedback received during the consultation process for the LAP and based on sustainable development and sensitive infill best practices.

In addition to a vision statement for the Neighbourhood, eight Planning Objectives were developed to guide the Stage I Land Use Concept Plan during the consultation process.

The Abbey Ridge LAP is reflective of the Vision and Planning Objectives contained in Section 2. The Land Use Concept Plan incorporates feedback received from property owners, the Fraser Heights Community Association and other stakeholders, as well as comments received from the public the October 1, 2015 public open house and the October 18, 2016 public open house. Based on feedback forms returned to the City, over 68% of those residents within the plan area indicated some level of support for the Abbey Ridge LAP land use concept, and minor refinements to the plan where made to better address areas of expressed concern, specifically:

- adjustments to the densities and transitions along Lyncean Drive and Barnston Drive East;
- refinements to the transitional densities around the acreage properties in the Abbey Drive area;
- the location of a proposed neighbourhood park on Lyncean Drive; and
- adjustments to the land use and density in the eastern part of the LAP.

2.1 VISION

A Neighbourhood Vision for the Abbey Ridge Neighbourhood was developed in consultation with community residents which envisions:

"An attractive and beautiful neighbourhood whose growth is planned to respect and complement the character of existing residential areas and the unique location of Abbey Ridge within the City of Surrey."

Visioning Principles

Respectful Design

Building design respects the scale and character of the neighbourhood, while providing a range of ground oriented housing forms, and choices. There is compatibility of new development with existing, and higher density housing is located primarily on appropriate sites along Barnston Drive, and adjacent to Highway 1 and Golden Ears Way.

Appropriate Transitions

Appropriate setbacks and transition areas for building heights and scale are encouraged along the edges of lower density and suburban residential areas.

Preserved Environment

The preservation of key natural areas, wildlife passages, large trees, and a respectful transition between urban and natural areas is encouraged, with lower density and cluster townhouse forms of housing surrounding environmentally sensitive lands.

Connection to Nature

Access to nature and recreation is provided through parks and greenways connections provided through the centre of the community, with greenway connections continued to the West Fraser Heights area and to neighbouring Regional and City parks.

Integrating Green Places

Incorporation of Green spaces and the clustering of homes along riparian areas, steep slopes and areas of high value tree stands is preferred in order to buffer the impact of urban development on environmentally sensitive areas.

Sense of Place

The local history, heritage, and unique character of the Abbey ridge Neighbourhood is respected while promoting the creation of new places.

2.2 OBJECTIVES

Eight Planning Objectives were developed to guide the Land Use Concept Plan during the consultation process based on the overall Vision for the Neighbourhood outlined in section 2.1.

Planning Objectives

1. Protect established areas

Retain and protect existing established and stable suburban neighbourhoods.

2. Provide appropriate land use transitions

Provide an appropriate interface between new and established neighbourhoods through compatible density, form and scale of housing, and through landscaped and natural buffers.

3. Protect environmental areas

Protect riparian areas and wildlife corridors through dedication or land purchase, and retain significant stands of trees where feasible on development sites.

4. Provide housing choice

Provide for housing choice through selected areas of higher density along the Highway 1 corridor, supporting transit service and local retail.

5. Develop an integrated local road network

Develop an integrated local road network providing connections within the plan area, and connections to surrounding areas.

6. Develop pedestrian and cycling network

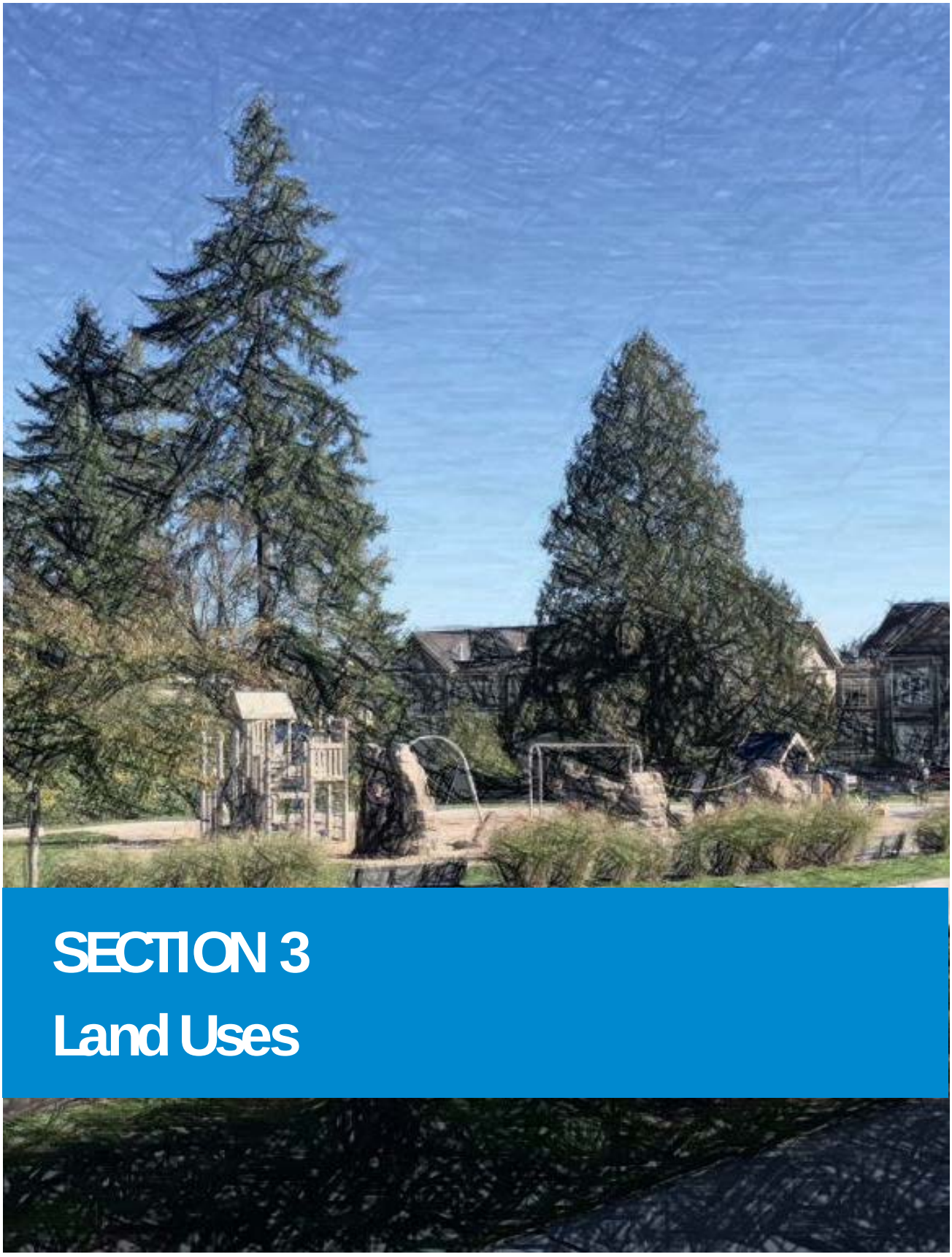
Develop a network of pedestrian and cycling routes, including connections to the Fraser Heights Greenway and to adjacent regional parks.

7. Establish neighbourhood level parks

Locate and develop neighbourhood parks in each sub-area, serving local residents.

8. Provide an equitable servicing and financial strategy

Develop a servicing strategy and financial strategy that ensures an equitable and sufficient contribution for development to infrastructure improvements and community amenities.



SECTION 3
Land Uses

3
Land Uses

The following section provides a general description of each of the land use designations in the Abbey ridge Land Use Concept, as shown in **Map 3.**

The Abbey Ridge Land Use Concept envisions a primarily single family residential neighbourhood with one small commercial area and a few strategically located townhouse and/or multiple family blocks. The plan also provides for the preservation of the majority of the industrial lands along the north eastern edge of the plan in order to maintain employment land opportunities.

The Abbey Ridge Local Area Plan includes specific provisions for:

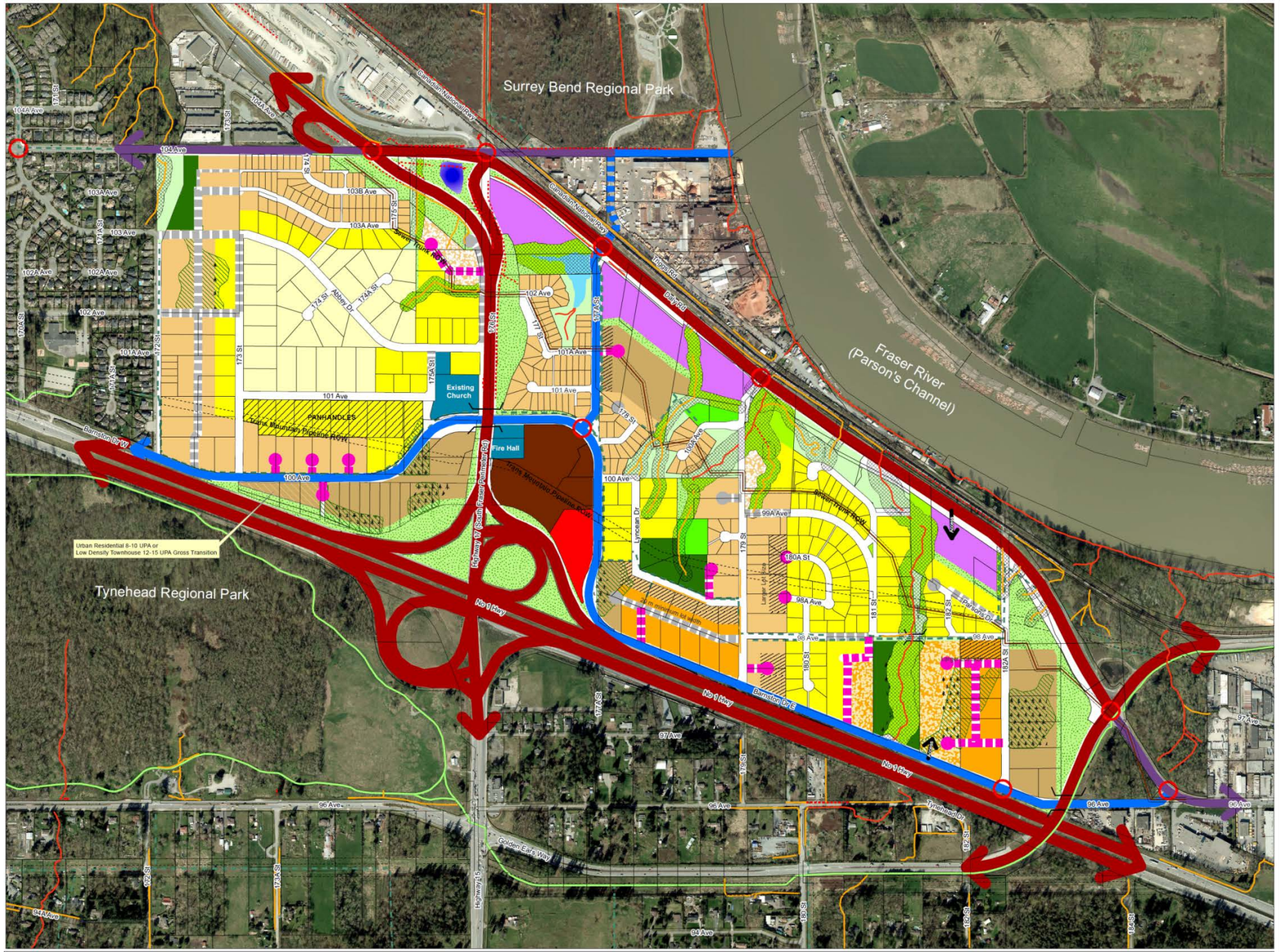
1. the retention of existing established and stable suburban/urban neighbourhoods;
2. appropriate interfaces between new and established areas;
3. protection of riparian areas and wildlife corridors and retention of significant tree stands;
4. additional housing choice through strategic areas of multifamily and urban single family areas along the Highway 1 corridor and Highway 17 (South Fraser Perimeter Road);
5. a more cohesive local road network providing connections within the plan area, and connections to the surrounding areas;
6. a network of pedestrian and cycling routes, including future connections to the Fraser Heights;
7. greenway and adjacent regional parks; and
8. inclusion of neighbourhood parks in each of the Neighbourhoods sub-areas, to serve local needs.

3.1
SUMMARY OF LAND USES

The summary of land use designation areas are shown in Table 1 below, with base densities requirements identified, as well as typical building form(s).

Table 1 - Summary of Land Uses

Land Use Designation	Density	Typical Building Form
Acreage Residential	1-2 UPA	Detached Single Family
Suburban Residential	2-4UPA	Detached Single Family
Urban Transition	4-5 UPA	Detached Single Family (Wide Lot)
Low Density Cluster	4-6 UPA	Detached Single Family
Single Family Residential	4-6 UPA	Detached Single Family
Urban Residential	8-10 UPA	Small Lot Detached Single Family
Urban Residential Transition	8-10 UPA	Detached Single Family
Medium Density Cluster	12-15 UPA	Single Family, Semi-Detached, Multi-family, 2 Story Townhouse
Low Density Townhouse	12-15 UPA	2-3 Story Townhouse,
Low Density Townhouse Transition	12-15 UPA	2 Story Duplex, Semi Detached Form
High Density Multiple Residential	25-30 UPA	3 Story Townhouse, Low Rise 4 Storey Apartments
Commercial	0.5 FAR	1 to 2 Storey Commercial Buildings
Institutional	0.3 FAR	Public Institutional Buildings
Industrial	0.5 FAR	Light Industrial Buildings



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Map 3 - Abbey Ridge Land Use Concept Plan

3.2

3.2
LAND USE PROJECTIONS

Table 2 below, summarizes the residential unit and population projection estimates for the LAP area based on the Land Use Concept shown in Map 3. A summary of the existing population and units and the land use projections area are also generally provided.

Table 2- Abbey Ridge LAP Building Projections

Abby Ridge Land Use Plan - Buildout Unit and Population Projections																
Land Use	Acres	Area %	Existing Units	Projected			Existing Population	Projected			Number of Existing Secondary Suites	Projected Secondary Suites	Existing Secondary Suite Population	Projected Secondary Suite Population	Possible Non-residential Floor Area	Projected Employment
				Low Units	Avg Units	High Units		Low Population	Avg Population	High Population						
Roads	90.9	21.3%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wet Land	1.6	0.4%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Storm Water Pond	0.9	0.2%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Landscape Buffer	25.9	6.1%	1	0	0	0	2	0	0	0	0	0	0	0	0	0
Existing Natural Area	16.0	3.8%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Future Natural Area	21.9	5.1%	2	0	0	0	6	0	0	0	0	0	0	0	0	0
Sanitary Trunk Sewer Buffer	4.6	1.1%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Neighbourhood Park	2.7	0.6%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Future Neighbourhood Park	7.8	1.8%	4	0	0	0	14	0	0	0	0	0	0	0	0	0
Industrial	16.1	3.8%	2	0	0	0	7	0	0	0	0	0	0	0	351,699	382
Institutional	4.7	1.1%	0	0	0	0	0	0	0	0	0	0	0	0	53,372	67
Neighbourhood Commercial	3.6	0.8%	0	56	56	56	0	152	152	152	0	0	0	0	7,265	10
Acreage Residential 1-2 UPA	30.9	7.2%	29	30	31	31	104	104	106	107	0	2	0	4	0	0
Suburban Residential 2-4 UPA Gross	65.0	15.2%	161	189	222	254	536	682	798	914	24	197	48	378	0	0
Urban Transition 4-5 UPA	6.2	1.5%	6	25	28	31	21	85	95	106	0	30	0	57	0	0
Low Density Cluster 4-6 UPA Gross	3.1	0.7%	4	12	15	18	12	41	50	59	1	10	2	19	0	0
Single Family Residential 4-6 UPA	62.3	14.6%	305	415	450	485	914	1,285	1,404	1,523	107	307	204	586	0	0
Urban Residential 8-10 UPA	13.9	3.3%	19	112	126	140	64	313	352	391	2	84	4	160	0	0
Urban Residential 8-10 UPA Transition	1.2	0.3%	2	9	10	11	7	25	28	31	0	6	0	11	0	0
Medium Density Cluster 10-12 UPA Gross	9.3	2.2%	0	93	102	111	0	252	277	302	0	57	0	109	0	0
Low Density Townhouse 12-15 UPA Gross	26.4	6.2%	22	312	354	396	75	1,046	1,188	1,329	0	0	0	0	0	0
Low Density Townhouse 12-15 UPA Gross Transition	0.9	0.2%	0	10	12	13	0	35	40	44	0	0	0	0	0	0
High Density Multiple Residential 25-30 UPA	11.2	2.6%	190	335	408	480	481	876	1,073	1,269	0	0	0	0	0	0
Total	**427.2**	100.0%	**747**	**1,598**	**1,813**	**2,027**	**2,242**	**4,896**	**5,563**	**6,229**	**134**	**693**	**258**	**1,326**	**412,336**	**459**

Population and Dwelling Unit Estimates

Based on the proposed Stage 2 Land Use Concept shown in Map 3, approximately 1,090 new additional residential dwelling units and a population increase of approximately 3,432 people is expected based on average projections at full build out of the LAP. Of these, it is expected that 217 new residential units housing some 591 people are expected within the approved townhouse/apartment site located east of 176 Street and south of Barnston Drive.

At full-build out (approximately 15 to 20 years from today), Abbey Ridge is projected to have a total of 1,812 dwelling units, with a total projected population of 6,888 (including 1,326 within suites) based on the proposed Stage 2 Land Use Concept.

Residential Growth Potential Areas

The Abbey Ridge LAP contains a mix of developed and undeveloped lands, with small remnant areas of limited infill potential, enclaves of suburban estates and more recent urban subdivisions, as well as some areas where additional infill growth may be accommodated in the future.

Map 4 shows these anticipated "limited growth", "suburban infill", and "future growth" areas based on the Land Use Concept. A summary of the residential unit and population projections are summarized below:

Limited Growth Area

This area includes 103 Acres or nearly 23% of the LAP area. There are currently 412 residential units within this area and very limited or no additional growth is projected. This area contains about four units per acre.

Suburban Infill Area

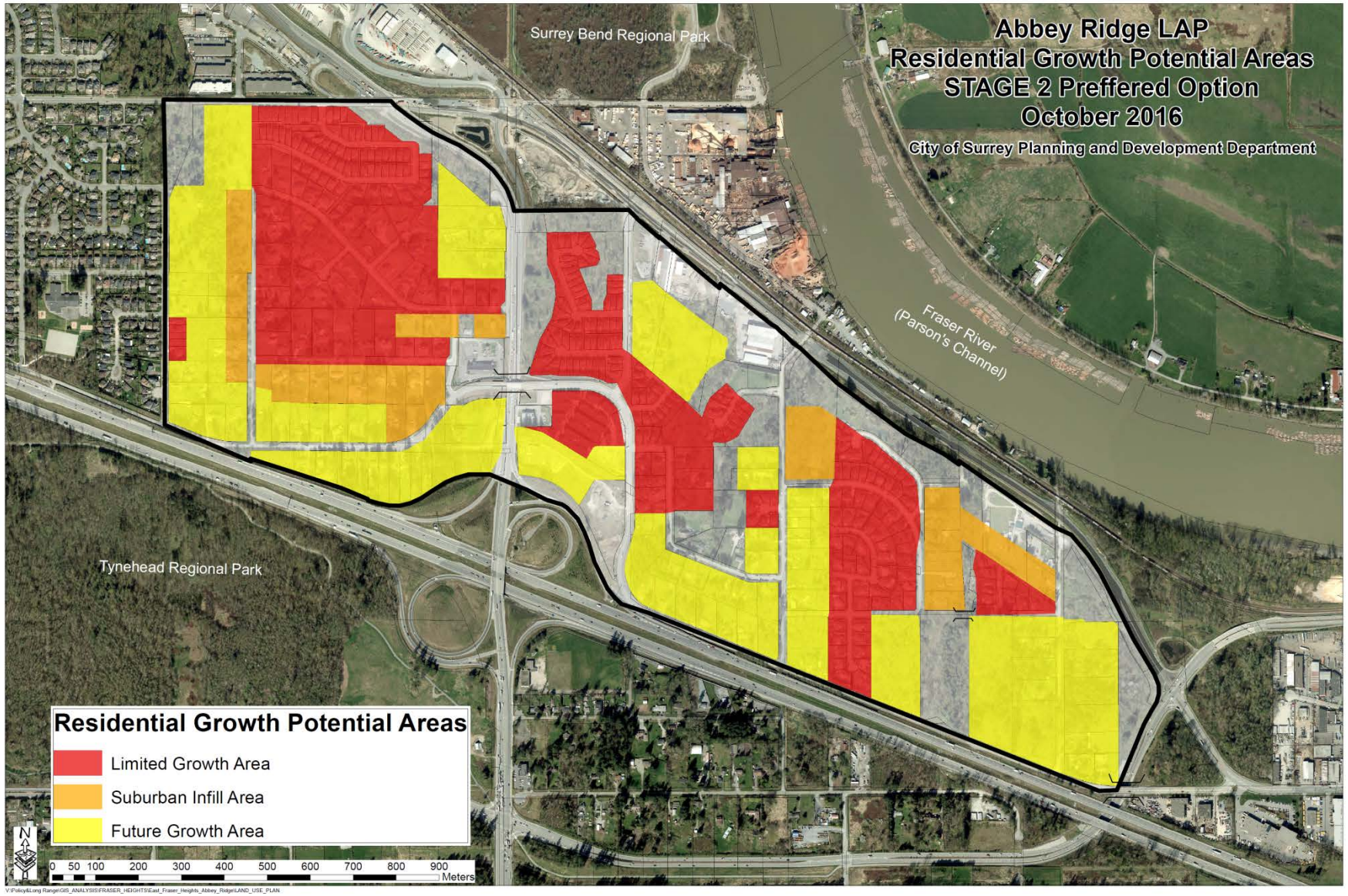
This area includes 25 Acres or 5 % of the LAP area. There are currently 23 existing residential units within this area, but has the potential for about 72 total units in the future. This area at build out will contain about three units per acre.

Future Growth Area

This area includes 136 Acres or 30% of the LAP area. There are currently 87 existing residential units within this area, but there is the potential for about 1,088 units in the future. This area at build out will contain about eight units per acre.

Areas not located within Future Urban Growth, Limited Growth, or Suburban Infill Areas

This area includes 188 Acres or 42% of the LAP area. There are no residential units within this area, and there are no units projected in the future. This area is intended for roads, landscape buffers, parks, industrial, institutional and commercial uses.



CITY OF SURREY

Map 4 - Abbey Ridge Residential Growth Potential Areas

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3.3 RESIDENTIAL USES

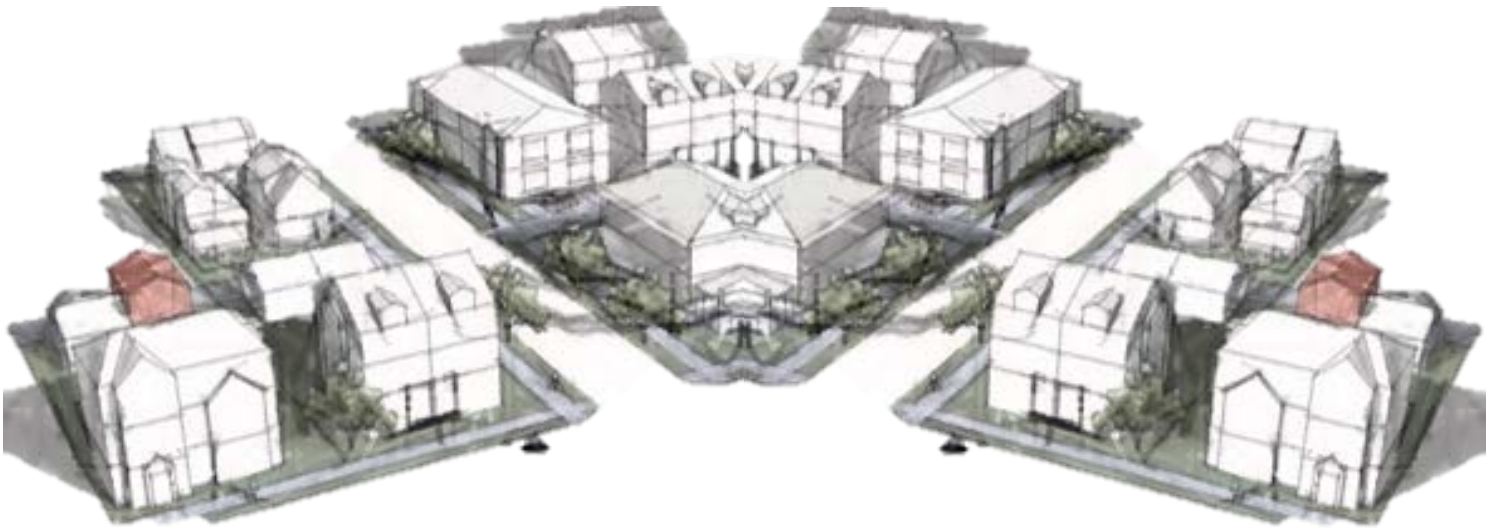
The Abbey Ridge Land Use Concept includes 10 residential land use designations, including:

- Acreage Residential
- Suburban Residential
- Single Family Residential
  - Urban Transition
- Low Density Cluster
- Medium Density Cluster
- Urban Residential
- Low Density Townhouse Residential
  - Low Density Townhouse Transition
- High Density Townhouse Residential

General Overview

Six of the designations allow only detached single family dwellings, and two are cluster housing designations that provide for both ground oriented single family dwellings and attached units depending on site conditions and open space provisions.

The two remaining designations allow multi-family development such as townhouses.



ACREAGE RESIDENTIAL

The Acreage Residential designation is intended to maintain an enclave of existing single family estates on one acre lots located in the Abbey Drive area. This designation may allow for subdivision to half acre suburban lots if site conditions permit, although it is expected that the majority of lots will remain one acre or larger for some time into the future, based on the current housing condition, housing age, and house location on the lots.

Development Guidelines:

- Densities may range up to a maximum of 5 units per hectare (2 units per acre).
- Densities may be calculated on a gross site area where sufficient parkland and/or community benefit is provided.
- Typical Zones or base zones that will be considered may include:

    - One-Acre Residential (RA) Zone;
    - Half-Acre Residential (RH) Zone;
    - Gross Density Half-Acre Residential (RH-G) Zone.

Example of Typical Acreage Residential lot with large single family home.

Suburban Residential

The Suburban Residential designation is intended to support larger residential lots. Three areas, totalling 66 acres of land, are designated Suburban Residential, including both existing subdivisions and areas that may be subdivided in the future to this density.

Development Guidelines:

- Densities may range up to a maximum of 10 units per hectare (4 units per acre).
- Densities may be calculated on a gross site area, where the minimum lot sizes may be reduced to no less than of 8,000 square feet and sufficient parkland or open space no less than 15% of the gross site area.
- Typical zones or base zones that will be considered may include:
  - Gross Density Half-Acre Residential (RH-G) Zone.
  - Single Family (RF) Zone.
  - Residential Cluster (RC) Zone.
- Pan-handle lots may be considered for Suburban Residential designated areas encumbered by the Trans Mountain Gas Pipeline right-of-way for the areas south of 101 Avenue where deemed appropriate.

An example of a typical suburban panhandle lot with limited road access available, adjacent to an encumbrance.

Example of Typical Suburban Residential lot with large single family home.

Pan

Spe

Single Family Residential

The Single Family Residential designation is intended to support detached housing on typical urban sized lots. This designation is proposed in areas throughout the LAP, including both existing subdivisions and future subdivision areas.

Development Guidelines:

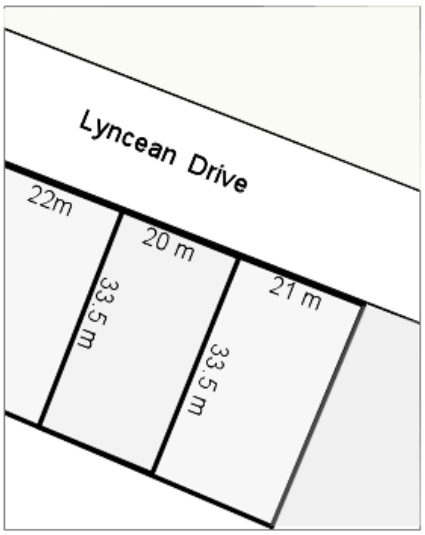
- Densities may range from 10 units per hectare (4 units per acre) up to a maximum of 15 units per hectare (6 units per acre).
- The calculation of unit density shall exclude the undevelopable area from the total area of the lot.
- Typical lot sizes may range between 7,200 to a minimum 6000 square feet.
- Typical Zones or base zones that will be considered may include:
    - Single Family Residential (RF) Zone;

Typical 15 m-20 m wide Residential Single Family (RF Zoned) 6000 square foot lot.

Urban Transition Area(s)

Special Considerations:

- Intended to support detached single-family residential development on lots that are somewhat wider and larger than the typical Single Family Residential designation to provide a sensitive interface transition for lands adjacent to existing Suburban Areas.
- Densities within the Urban Transition areas may range from 10 units per hectare (4 units per acre up to a maximum of 12.5 units per hectare (5 units per acre).
- The Urban Transition areas of the 180A Street and 98A Street cul-de-sacs are intended to provide an appropriate transition to adjacent, larger existing suburban lots, as well as adjacent to existing suburban lots west of 180 streets.
- Lots created through subdivision within the Urban Transition area adjacent to Lyceum Drive will have:
    - a minimum lot width of no less than 20 meters, and
    - a minimum lot area of no less than 7,200 square feet.



Example of Urban Transition sized lots along Lyncean Drive.

Low Density Cluster Residential

The Low Density Cluster Residential designation allows for housing on smaller urban lots, with substantial public parkland or strata open space set aside within the subdivision. This designation will only be considered if there are special amenities such as mature trees/vegetation, watercourses, steep slopes, ravines or other landscape features worthy of preservation; or the lot can contribute open space to a park and/or biodiversity preservation area.

Development Guidelines:

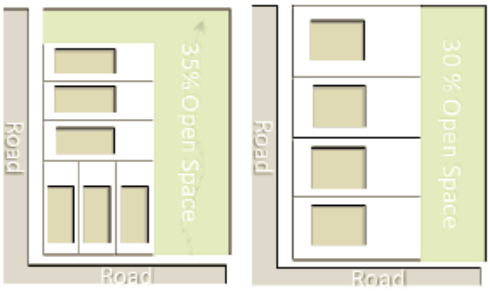
- Densities may range from 10 units per hectare (4 units per acre) up to a maximum of 15 units per hectare (6 units per acre) calculated on the bases of the entire lot.
- The calculation of unit density may include gross site area where opens space in an amount of not less than 15%-30% of the lot is preserved in its natural state or retained for park or strata open space.
- If special amenities or open space are not provided, the calculation of unit density shall exclude the undevelopable area from the total area of the lot and be calculated on the net Developable Area of the lot only.
- Typical single family lot sizes may range between 6,000 to a minimum 4,000 square feet, with a minimum lot width of no less than 13.4 metres.
- Typical Zones or base zones that will be considered may include:

  - Single Family Residential (RF) Zone
  - Single Family Residential Gross Density Zone (RF-G);
  - CD Zone based on Cluster Residential (RC) Zone if Open Space provided.

Typical Cluster Residential Small lot development

Special Considerations:

- This designation may include a bare land strata housing to more efficiently and effectively utilize the land, at the discretion of the City of Surrey Approving Officer.
- Housing types may include: single family dwellings, and/or a combination of single family, semi-detached or duplex dwellings as long as the amount of open space is provided in proportion to the housing types.
- Special Amenity areas provided as Open space may include:
  - Utility rights-of-way, excluding City Services;
  - Tree Preservation Areas;
  - Steep slopes greater than 15%;
  - Riparian Areas beyond typical streamside protection setbacks;
- Green Infrastructure Areas, and/or similar features, which make the said portion of the lot unsuitable for the placement of buildings and structures.
- Streamside Protection Setbacks shall be determined by the Streamside Protection Section of the Surrey Zoning Bylaw, No 1200, and may not be included unit density calculation.



Example of 30-35% open space provided on a 1 acre Low Density Cluster lot at 4 and 6 UPA.

Medium Density Cluster Residential

The Low Density Cluster Residential designation allows for a mix of single family housing on smaller urban lots and/or ground oriented multiple family residential buildings such as semi-detached, duplex, triplex, or ground oriented townhouses, with substantial public parkland or strata open space set aside within the subdivision. This designation will only be considered if there are special amenities such as mature trees/vegetation, watercourses, steep slopes, ravines or other landscape features worthy of preservation; or the lot can contribute open space to a park and/or biodiversity preservation area.

Development Guidelines:

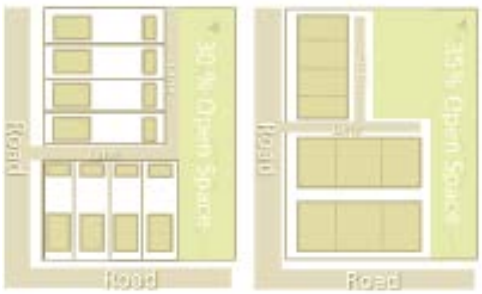
- Densities may range from 25 units per hectare (10 units per acre) up to a maximum of 30 units per hectare (12 units per acre) calculated on the bases of the entire lot.
- The calculation of unit density may include gross site area where opens space in an amount of not less than 15%-30% of the lot is preserved in its natural state or retained for park or strata open space.
- If special amenities or open space are not provided, the calculation of unit density shall exclude the undevelopable area from the total area of the lot and be calculated on the net Developable Area of the lot only.
- A minimum 1 Acre Parcel consolidation is required before within this designation before subdivision will be considered.
- Residential unit lot sizes will vary.
- Typical Zones or base zones that will be considered may include:

    - CD Zone based on Cluster Residential (RC) Zone.
    - CD Zone based on Single Family Residential-13 (R13) Zone
    - CD Zone based on Single Family Residential Gross Density Zone (RF-G);
    - Semi-Detached Residential (RF-SD) Zone
    - Multiple Residential (RM-15) Zone

Special Considerations:

- May include a bare land strata housing to more efficiently and effectively utilize the land, at the discretion of the City of Surrey Approving Officer.
- Housing types may include: a combination of single family, semi-detached and/or multiple family housing as long as the amount of open space is provided in proportion to the housing types.
- Special Amenity areas provided as Open space may include:
    - Utility rights-of-way, excluding City Services;
    - Tree Preservation Areas;
    - Steep slopes greater than 15%;
    - Riparian Areas beyond typical *streamside protection setbacks;
    - Green Infrastructure Areas, and/or similar features, which make the said portion of the lot unsuitable for the placement of buildings and structures.

**Streamside Protection Setbacks shall be determined by the Streamside Protection Section of the Surrey Zoning Bylaw, No 1200, and setback areas may not be included unit density calculation.*



Example of 30-35% open space provided on a 1 acre Medium Density Cluster lot at 8 and 10 UPA.

Urban Residential

The Urban Residential designation is intended to provide small single-family detached lots at urban densities. This form and density of housing may also be considered in designations that permit higher densities. The areas designated for Urban Residential are found adjacent to Highway 1 along Barnston Drive East:

Development Guidelines:

- Densities may range from 20 units per hectare (8 units per acre) up to a maximum of 25 units per hectare (10 units per acre) calculated on the bases of the net developable area of the lot.
- The calculation of unit density shall exclude the undevelopable area from the total area of the lot.
- Typical single family lot sizes may range between 5,000 to a minimum 3,500 square feet.
- For lots served by rear lanes, the minimum lot width may be a minimum of 12 metres, and for lots without rear lanes (front driveways) the minimum lot width is 13.4 metres.
- No front lot driveway access will be permitted along Barnston Drive East Avenue within this designation for traffic safety reasons.
- Typical Zones or base zones that will be considered in the Single Family Residential Designation may include:

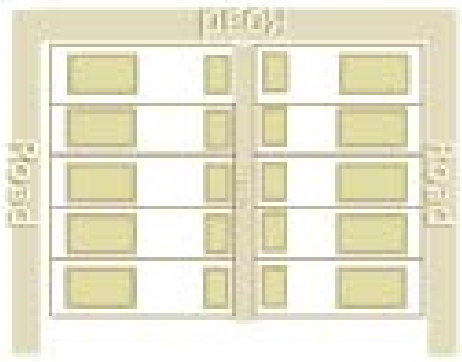
    - Single Family Residential (RF) Zone
    - Single Family Residential-13 (R13) Zone.

Typical Urban Small Lot 13.4 meter wide front loaded single family lot.

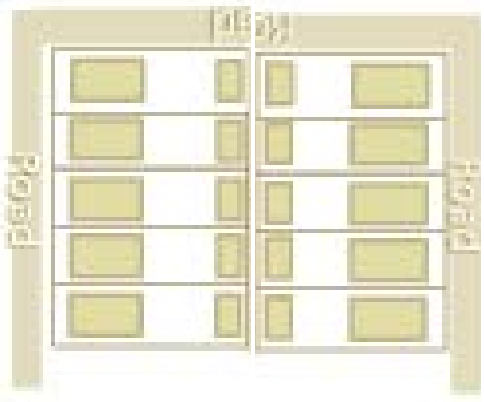
Large Lot Frontage Area

Special Considerations

- A small band of "large lot frontages" is identified within the Urban Residential designation west of 182 Street on the south side of 98 Avenue in order to provide an appropriate transition with existing suburban lots on the north side of 98 Avenue.
- For lots within this designated Larger Lot Frontage area, the minimum lot width must be no less than is 15 metres.



Example of Urban Residential sized lots with rear lane access.



Example of Urban Residential sized lots with 13.4 meter front driveway access.

Low Density Townhouse Residential

The Low Density Townhouse Residential designation is intended to support the development of ground-oriented multifamily residences such as townhouses or duplexes and/or row houses on individual fee simple or strata lots.

Portions of the lands in this designation may be appropriate for lower-density housing such as detached housing, and to provide complimentary transition to lower density areas, depending on site conditions and tree preservation potential.

Development Guidelines:

- Densities may range from 30 units per hectare (12 units per acre) up to a maximum of 37 units per hectare (15 units per acre) calculated on the bases of the entire lot.
- Typical Residential unit size will range between 2,000 to 1,200 square feet.
- Buildings should not exceed 11 meters (36 feet) in height) and will typically include 2 and 2 and ½ story buildings.
- A minimum 1 Acre Parcel consolidation is required before within this designation before subdivision will be considered.
- Typical Zones or base zones that will be considered in the Low Density Townhouse Residential Designation may include:
  - Multiple Family (RM-15) Zone
  - Semi-Detached Residential (RF-SD) Zone

Example of Townhouse Protect incorporating Tree protection in the rear of the lot.

Tree preservation Areas

Special Consideration:

- This designation includes areas of proposed tree preservation, where significant stands of trees have been identified in the Abbey Ridge Environmental Study. These tree retention areas may be incorporated into the open space of a strata development, landscape buffers, and/or may be conveyed to the City as parkland, at the City's discretion, at the time of development where feasible.
- A large landscape buffer of trees and vegetation adjacent to major highways and roads in encouraged to screen residential developments from high traffic areas.
- Incorporation of individual tree specimens within the development site is encouraged where feasible.

Example of tree protection

High Density Multiple Residential

The High Density Multiple Residential designation is intended to reflect a single, approved higher-density development in the area adjacent to the Highway 1 and Highway 15 interchange along Barnston Drive East.

Portions of this designation are built out, while other are currently under construction, or will be included in future phased development. The area is regulated by a Comprehensive Development Zone that includes townhouses, and low-rise four story apartments. The land use designations in the Abbey Ridge LAP are not intended to affect the current zoning of the site, but provide guidance for any future proposals if there are amendments to the prevailing Comprehensive Development Zone(s).

Example of typical ground oriented townhouse development.

Development Guidelines:

- Densities may range from 74 units per hectare (30 units per acre) and may not exceed a floor area ratio (FAR) of 1.3 or 112 units per hectare (45 units per acre).
- May include apartment buildings (generally up to 5 storeys, and higher-density townhouses constructed as multiple family buildings.
- Typical Zones or base zones that will be considered in the Low Density Townhouse Residential Designation may include:
  - Multiple Family (RM-30) Zone
  - Multiple Family (RM-45) Zone
  - Multiple Family (RM-70) Zone

Example of 5 Storey Residential Apartments proposed in the Hillcrest Comprehensive

3.4 COMMERCIAL

The Commercial designation is intended to support neighbourhood-servicing retail and office developments. Primary uses within the Commercial designation are retail and stand-alone office uses including institutional offices.

Multi-unit residential uses may also be permitted in mixed use development provided that ground-level uses are exclusively commercial. Public facilities may also be considered a permitted use within the Commercial designation.

Development Guidelines:

- Densities within the Commercial designation may range from 0.5 up to 1.0 FAR, subject to an appropriate interface with adjacent residential areas.
- Commercial, multiple unit residential, and mixed use office developments within this designation are subject to the issuance of a Development Permit, in accordance with DP1 of the Official Community Plan.

3.5 INDUSTRIAL USES

The Industrial designation supports light industrial uses, including manufacturing, warehouse, wholesale trade and equipment storage and repair.

Accessory uses that operate ancillary to a main industrial use may include limited office uses, and commercial uses that are strictly limited to those that support in industrial activities.

Development Guidelines:

- Densities within the Industrial designation may range from 0.3 up to 0.5 FAR, subject to an appropriate interface with adjacent residential areas.
- Industrial and mixed use office developments within this designation are subject to the issuance of a Development Permit, in accordance with DP1 of the Official Community Plan

3.6 INSTITUTIONAL USES

There are currently two Institutional designated areas within the LAP accounting for 2.0 hectares (5.0 acres) of land to accommodate existing institutional uses:

- A Korean Central Presbyterian Church, located at 10117 - 176 Street, planned to be maintained and expanded for church uses; and
- Fire Hall #5, located on Barnston Drive, immediately east of 176 Street along Barnston Drive East, which will also remain.

Existing City of Surrey Fire Hall #5 Detachment.

Existing Korean Central Presbyterian Church

School Projections

If current school participation rates in the area continue, it is estimated that as little as 150 elementary students and 150 secondary students would be generated by future development in the LAP. A more cautious scenario, however, is that participation rates may increase as the housing stock is varied to more family oriented housing.

Based upon this precautionary assumption, the Surrey School District No. 36 staff have indicated that the LAP could generate up to 300 additional elementary students and 250 additional secondary students in the Surrey School District system over the total buildout of the plan.

The local elementary school, Bothwell Elementary, has capacity to accommodate the expected growth in the student population, and I the event of higher than anticipated growth the school property is sufficient in size to permit school expansion if required. Based on growth projections, School District staff do not anticipate the need for a new elementary or secondary school site in this LAP.

If development occurs more rapidly than anticipated (two to seven years), and depending on how the rest of the neighbourhood's demographics evolve, it is possible that secondary school catchment changes would have to contemplate sending some of the area school aged children to a secondary school south of Highway 1 to reduce the pressure on Fraser Heights Secondary School.

3.7 LANDSCAPE BUFFER AREAS

Approximately 7.0 hectares (17.4 acres) of landscape buffers are identified in the Abbey Ridge LAP.

Some of these areas are currently within unconstructed road rights-of-way such as the area east of Highway 15, and some areas are future landscape buffers to ensure appropriate interface between industrial and residential areas or between highways and residential areas.

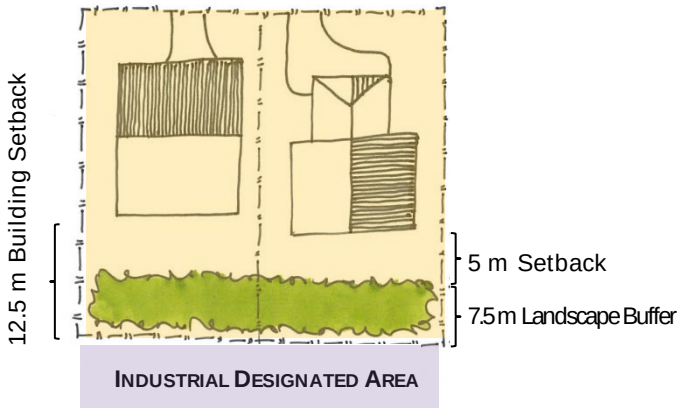
The following section identifies some of the building and landscape buffer guidelines for the LAP.

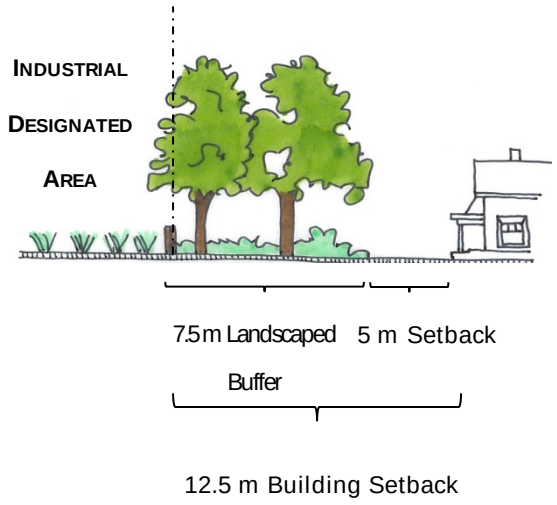
.

Industrial - Residential Buffers

For Residential Developments adjacent to the Industrial Designated lands the following Setback and Buffer requirements apply:

- Minimum building setback from the Industrial Designated Property is 12.5 m
- Zoning setbacks should be increased, where possible, to accommodate appropriate and effective rear yard space for buffers
- Provide a minimum of 5 m of rear yard space between the landscaped buffer and the rear face of a single family dwelling (illustr.)
- Minimum vegetated buffer width is 7.5 m
- Vegetated landscape buffer remains under private or strata ownership.

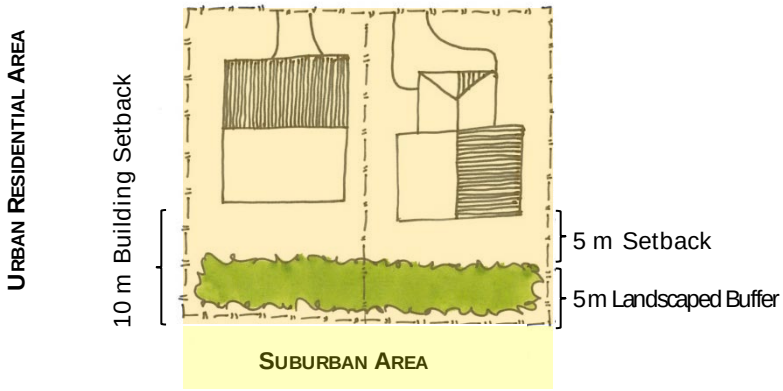


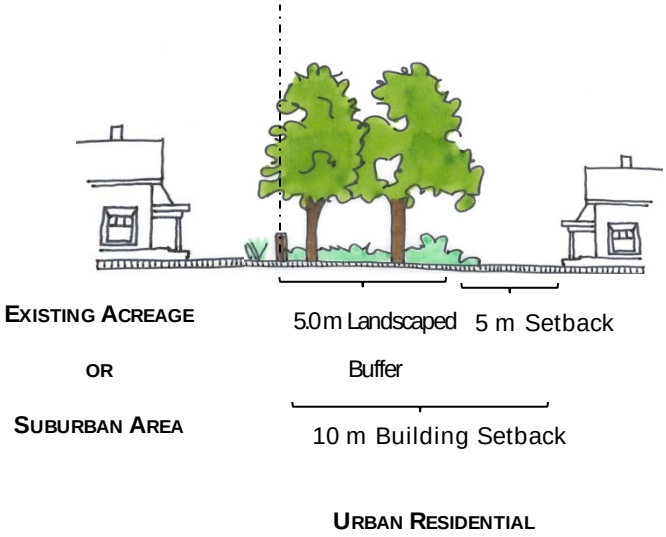


Suburban – Urban Residential Buffers

For Urban Residential Developments adjacent to existing Suburban Residential lands the following Setback and Buffer requirements apply:

- Minimum Urban Residential building setback from Acreage or Suburban Designated property is 10 m
- Zoning setbacks should be increased, where possible, to accommodate appropriate and effective rear yard space for buffers
- Provide a minimum of 5 m of rear yard space between the landscaped buffer and the rear face of a single family dwelling (illustr.)
- Minimum vegetated buffer width is 5 m
- Vegetated landscape buffer remains under private or strata ownership.

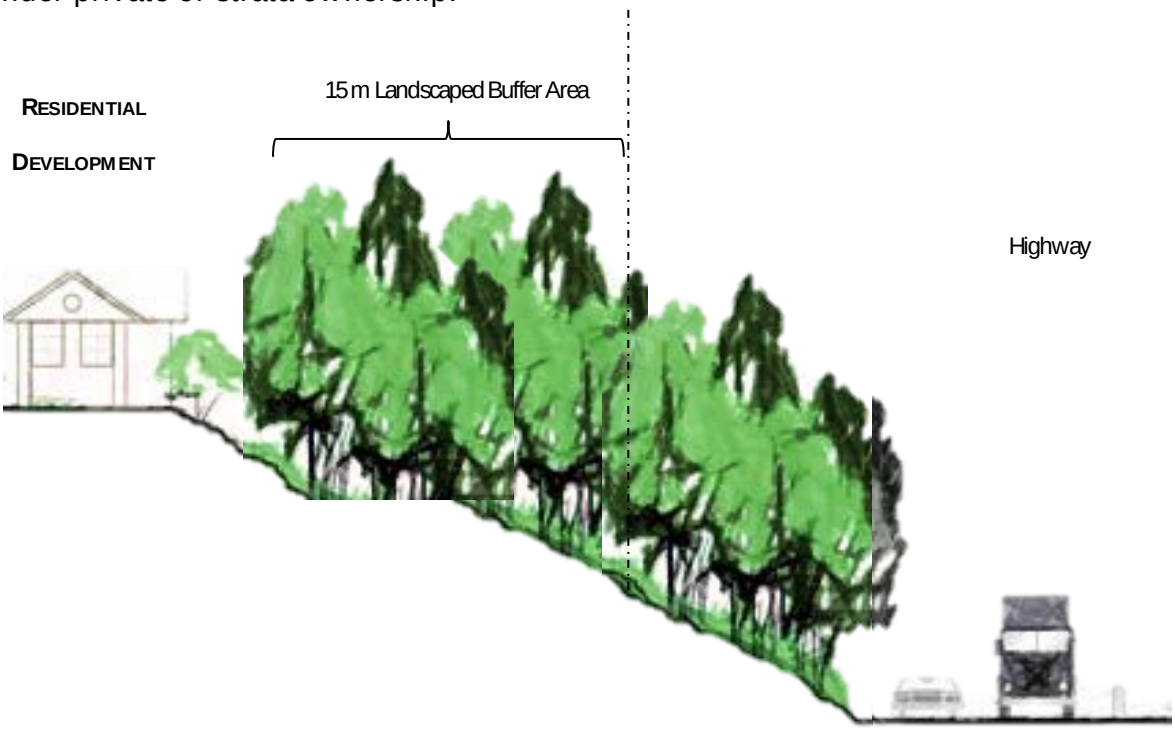




Highway –Residential Buffers

For Residential Developments adjacent to a Highway the following Setback and Buffer requirements apply:

- Minimum Residential building setback from Highway #1 Road Right of Way is 20 m
- Zoning setbacks should be increased, where possible, to accommodate appropriate and effective rear yard space for buffers
- Provide a minimum of 5 m of rear yard space between the landscaped buffer and the rear face of a residential dwelling.
- Minimum vegetated buffer width is 15 m Vegetated landscape buffer remains under private or strata ownership.



3.8 PARKS

Parks amount to approximately 20 hectares (51 acres), or just over 11% of the total LAP area as illustrated in Map 5.

There are currently 8.5 hectares (21 acres) of existing parkland in the LAP.

The LAP identifies, approximately 12 hectares (30 acres) of new parkland. Two types of parkland will be acquired in the LAP area, neighbourhood and natural area parks.

Neighbourhood Parks

A total of 3.1 hectares (7.8 acres) of neighbourhood parks are proposed within the LAP.

Neighbourhood parks provide local park amenities to serve residents and are located to be within walking distance of most residences. Neighbourhood park amenities may include:

- playgrounds;
- passive lawn/open space;
- sports courts (ball hockey/basketball);
- pathways/trails; and
- benches/picnic tables.

For all new neighbourhood park there will be a public engagement process to determine what amenities will be provided in each park.

Existing Natural Areas

A total of 7.5 hectares (18.5 acres) of existing natural area parkland and open space is located within the LAP.

These areas provide some active amenities, contribute to the identity and sense of place for residents living nearby and provide important ecosystem services

Proposed Natural Areas

A total of 8.8 hectares (21.7 acres) of additional natural area parkland is proposed within the LAP.

Natural area parkland accommodates natural amenities such as mature vegetation; watercourses, ravines or other landscape features worthy of preservation and contribute to the open space and green infrastructure of the area. These natural areas are made up of the following:

Riparian Areas

Riparian areas are located along Class A, Class AO and Class B fisheries watercourses that provide for limited or no public access, as their function is to protect sensitive habitat areas, including the land around all significant creeks.

The final amount and location of riparian areas will be subject to Section 7A – Streamside Protection of the *Surrey Zoning Bylaw, No, 12000, 1993*.

Natural Area Amenities

Natural area amenities may include:

- natural area replanting and re-naturalization;
- forest trails; and
- creek crossings where pathways or greenways cross a creek.

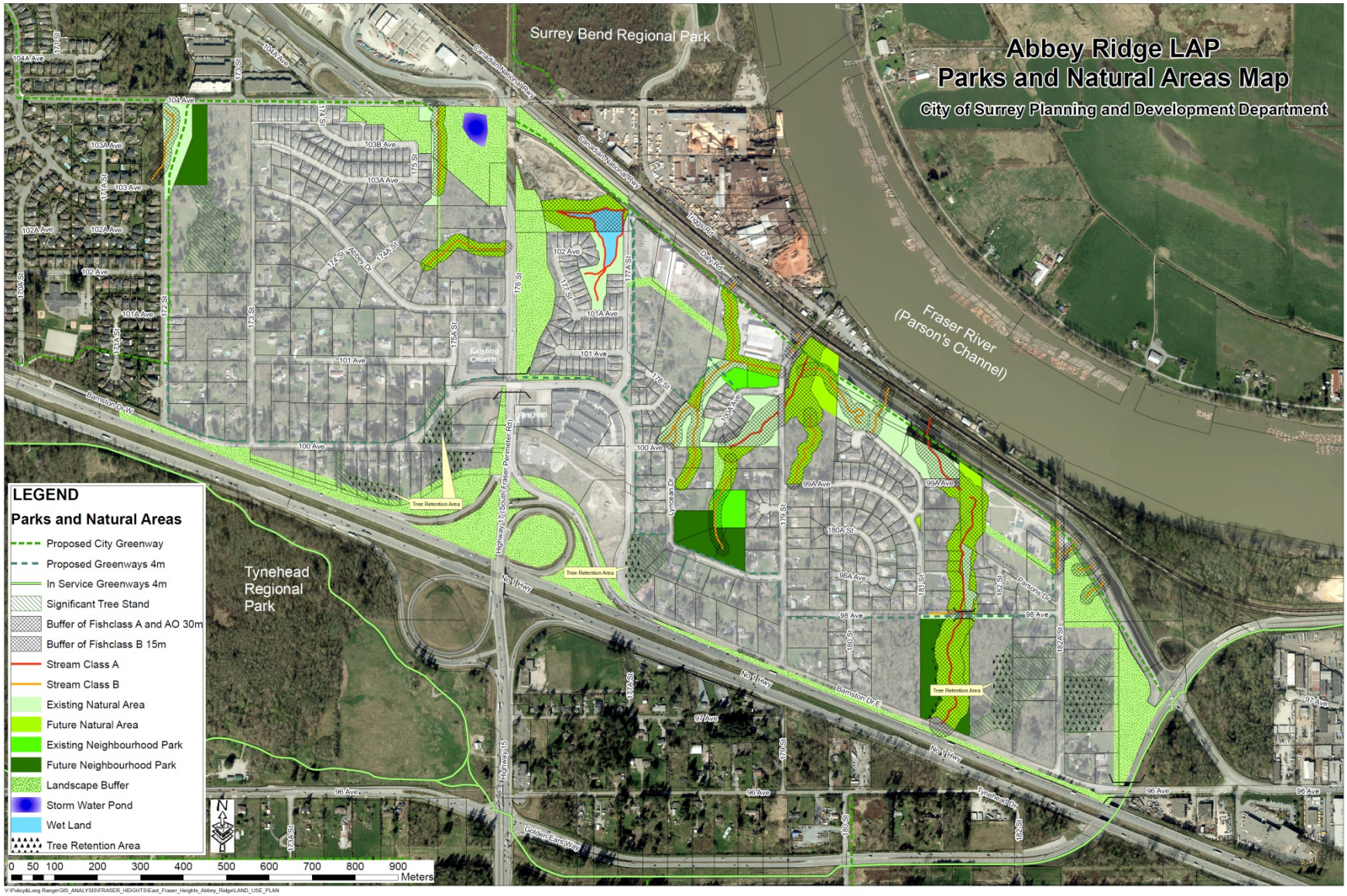
Tree Retention Areas

These include significant tree retention areas dedicated to the City as parkland or preserved as open space in strata developments, conveyed during the site development process;

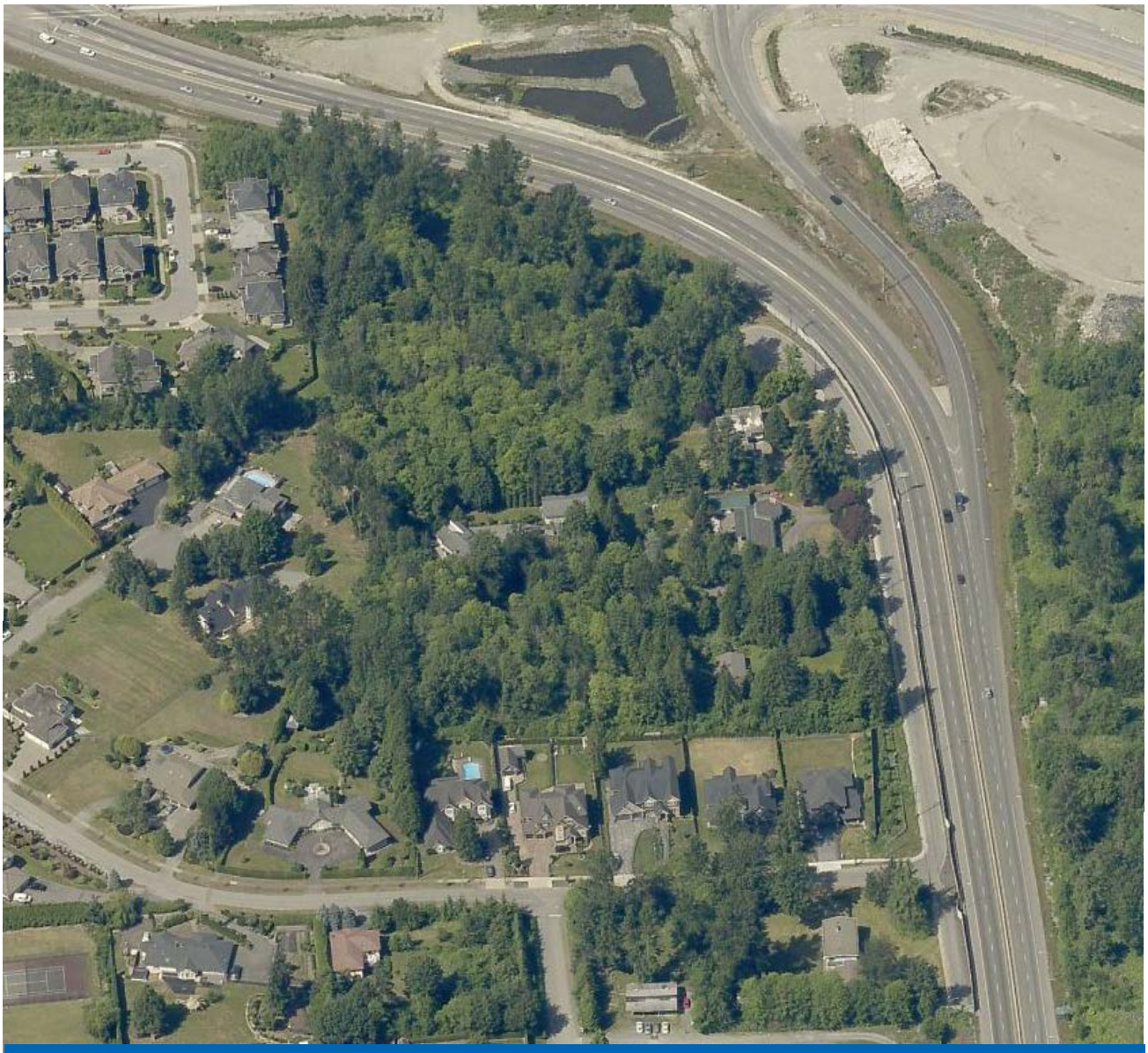
Biodiversity Corridor Areas

Biodiversity Corridors include linear parks that provide natural areas and support wildlife movement to and through the plan area. Where these corridors include lands outside of riparian setbacks they may contain limited active park amenities such as:

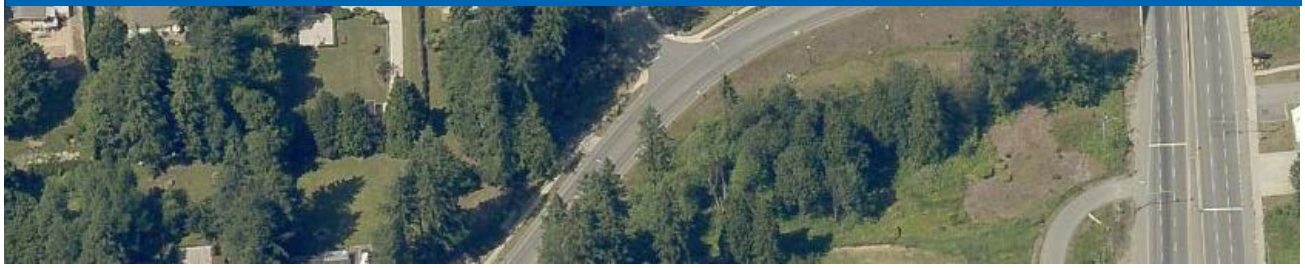
- natural areas, reforestation and re-naturalization;
- pathways/trails; and
- benches/ rest areas and viewpoints along pathways and trails



Map 5 - Abbey Ridge Parks and Natural Areas



SECTION 4
Transportation Network



4
TRANSPORTATION NETWORK

This section of the report describes the current and proposed transportation networks and the transportation improvements required for the development of the Abbey Ridge Local Area Plan (LAP). A transportation assessment of the future traffic generated by the LAP was conducted to determine the effects on current transportation infrastructure and the required improvements for the network.

4.1 EXISTING ROAD NETWORK

The Abbey Ridge LAP is in close proximity to two major Provincial Highways (Highway 1, and Highway 17), and one future Provincial Highway (Golden Ears Connector), so from a regional-access perspective, the immediate area is well served with the multiple provincial highways.

Provincial Highways

Highway 1 (Trans Canada Highway)

Highway 1 is a Provincial Highway that is operated and maintained by the Ministry of Transportation and Infrastructure (MoTI). In 2013, the section along the Abbey Ridge LAP was widened along with the construction of the new Port Mann Bridge. The plan area has no direct connection to Highway, and is connected to Highway 1 through the Highway 15, and 160 Street interchange.

Highway 17 (South Fraser Perimeter Road)

Highway 17 is a Provincial Highway that opened in 2013 to provide a regional connection between the municipalities of Surrey, Delta, and New Westminster (via Pattullo Bridge). This highway creates a bypass through the City of Surrey, and has relieved the traffic demand along some of the City's arterial roadways. Highway 17 is a regional highway that also provides connections to Pattullo Bridge, Roberts Bank Deep Sea Terminal, and the Tsawwassen Ferry Terminal.

Golden Ears Connector

The Golden Ears Connector (GEC) is expected to be a future highway that is provincially owned and maintained. The main role of this highway is to provide a direct connection between Highway 17 and the Golden Ears Way that connects to the Golden Ears Bridge and the Provincial Highway system north of the Fraser River. Currently, vehicles are required to access Highway 15 to connect in between Highway 17 and Golden Ears Way.

Arterial Roads

104 Avenue – Arterial

104 Avenue borders the northwest corner of the Abbey Ridge LAP, which currently serves as one of the east-west options to access and egress the area. Further to the west, 104 Avenue connections to the Highway 1 Interchange located at 160 Street. To the east, 104 Avenue intersects with Highway 17, which links directly to Highway 15 and the Pacific Highway Crossing to the south. The existing 104 Avenue has not been widened to its ultimate cross section with one travel lane in each direction and limited pedestrian infrastructure.

Collector Roads

Barnston Drive and 100 Avenue

Barnston Drive and 100 Avenue are the main collector roads that service the existing Abbey Ridge LAP area. To the east, Barnston Drive connects to the Port Kells industrial area, North Langley, and the Golden Ears Bridge. To the west, Barnston Drive leads to 168 Street and 104 Avenue, and provides access into the Fraser Heights community. The current configuration of this corridor is one travel lane in each direction, with intermittent stretches of walking and cycling infrastructure.

177A Street

177A Street is a north-south collector road that connects the future Golden Ears Connector to Barnston Drive. As the Golden Ears Connector connects to Hwy 1, Hwy 15, and Hwy 17, it is anticipated that 177A Street will provide an important connection for existing and future residents of the Abbey Ridge LAP, and it is anticipated that traffic signals will be required at both ends of 177A Street. The ultimate cross section 177A Street is already achieved through previous adjacent development applications.

Local Roads

The existing local roads within the plan area are relatively disconnected due to several factors. The Highways act as barriers for local connections and eliminates the opportunity to develop a finer grid road network as typically found in other secondary plans. Further, environmental protection of existing riparian areas prohibits local road connections between previously established single family pockets have been taken into consideration when establishing the proposed road network

4.2 PROPOSED TRANSPORTATION NETWORK

A Traffic Impact Assessment (TIA, see Appendix A-2) was conducted by a Transportation Consultant to forecast and model the anticipated traffic volume increase as a result of the planned development.

The Proposed Transportation Network Plan is illustrated in Map 6 following descriptions of each of the Roadway Improvements.

Future Roadway Improvements

104 Avenue – Arterial

As explained in the section above, 104 Avenue is an arterial road that is not ultimately widened to the City's divided arterial standard. The traffic generated by the Abbey Ridge LAP area will create an impact on the portion of 104 Avenue within the existing Fraser Heights neighbourhood, which is beyond the Plan's boundary of 172 Street. Therefore, the servicing needs for 104 Avenue are considered for the whole 104 Avenue corridor (from 160 Street to Highway 17), and not only the portion within the Plan area.

The build-out scenario of the Abbey Ridge LAP will create additional vehicular demand along 104 Avenue, as it is one of main routes to access and egress the plan area to and from the west. However, the increase in traffic volume is not anticipated to trigger the need for additional vehicular capacity along this corridor. As such, 104 Avenue is envisioned to be constructed with sidewalks and cycling infrastructure will be installed, while maintaining one travel lane in each direction. This cross section is considered to be sufficient in the foreseeable future.

Barnston Drive and 100 Avenue - Collector

Typically, completion of collector roads occur through adjacent developments that fronts onto collector roads. The Abbey Ridge LAP identifies development along the Barnston Drive and 100 Avenue corridors, so it is expected that the ultimate cross section of the two roadways are to be secured through the development application process. The fronting development Ultimately, this corridor is designed to accommodate sidewalk along the north side, along with one travel lane in each direction, and on-street parking where space permits.

Local Roads

The opportunities to establish additional local roads within the LAP have been constrained due to Provincial Highways, and environmentally sensitive areas. Further, the Abbey Ridge LAP has experienced pockets of development in the past where local road networks were established through individual applications. This presented further limitations to plan additional local roads, as consideration must be taken for existing residential neighbourhoods. In areas where limited development had occurred, a finer grid road network was designed for as part of the Abbey Ridge LAP. This is a guiding principle of the Transportation Strategic Plan to ensure vehicles are distributed even to avoid significant burden on a particular road.

All local roads, both existing and future, within the Abbey Ridge LAP will ultimately accommodate sidewalks, boulevards, street lighting, and street trees as per the local road cross section in the Engineering Design Criteria. Depending on the fronting developments and its density, on-street parking will be available on both sides of all local roads.

Flex Roads

The Abbey Ridge LAP identifies several Flex Road, which provide flexibility in terms of the ultimate road alignment. These roads are present due to the uncertainties of development form and type, and environmental impacts and constraints. The appropriate width and alignment of flex roads will be determined through the development application process where the site and concept plans are more certain.

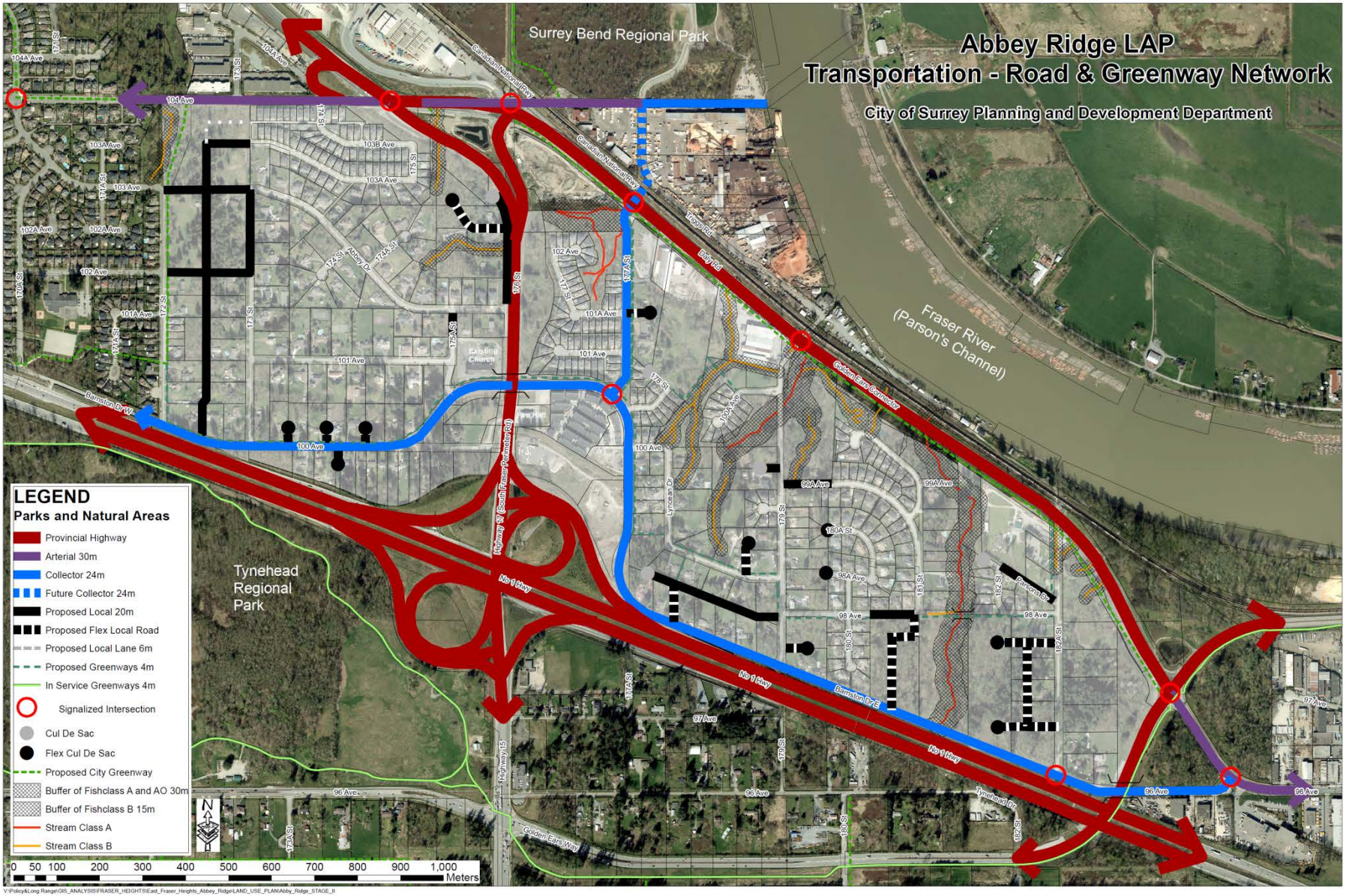
Intersection Improvements

Based on the submitted TIA by the Transportation consultant, it was determined that the anticipated traffic generated by the Abbey Ridge LAP will require multiple intersection improvements. Table 3 below identifies intersections that should be signalized.

Table 3 - Intersections that should be signalized

Location	Current Condition	Upgrade Rationale
Barnston Drive and 177A Street	Stop Controlled	177A Street connects the Plan area to the future Golden Ears Connector and Hwy 17, anticipated volume along this road and the intersection at Barnston Drive is expected to be higher than current day volume.
Barnston Drive and 182 Street	Stop Controlled	Additional traffic due to anticipated population will require signalization
104 Avenue and 170A Street	Stop Controlled	170A is outside of Plan area, but connections to anticipated development via 172 Street and 173 Street. Additional traffic due to anticipated population will require signalization
96 Avenue and Barnston Drive	Stop Controlled	Intersection is outside of Plan area, but Barnston Drive is a collector road that will experience additional traffic due to anticipated population, and will require signalization

The listed intersections identified in Table 3 above would only be considered for signalization if warranted due to population and traffic volumes increase. As the current traffic volumes do not meet the City's warrant, these intersection improvements will not be in Engineering's 10 year Servicing Plan. Staff will monitor the traffic volumes, and continue to evaluate the need for a traffic signal.



Map 6 – Abbey Ridge Transportation & Greenway Network

4.3
TRANSPORTATION COSTS AND FINANCING

Table 4 below, summarizes the infrastructure improvements, and the total and DCC eligible cost of each improvement.

Table 4 - Transportation Infrastructure Improvements and DCC eligible Costs

Category	Road	Segment	Total Cost	DCC Eligible
Arterial Widening	104 Avenue	172 Street to Hwy 1	$12,000,000	$6,000,000
Collector Upsizing	100 Avenue and Barnston Drive	172 Street to 18300 Block	$2,967,000	$2,809,500
Category	**Treatment**	**Intersection**	**Total Cost**	**DCC Eligible**
Intersection Improvements	Signal	Barnston Drive and 177A Avenue	$250,000	$125,000
Intersection Improvements	Signal	Barnston Drive and 182 Street	$250,000	$250,000
Intersection Improvements	Signal	104 Avenue and 170A Street	$250,000	$125,000
Intersection Improvements	Signal	Barnston Drive and 96 Avenue	$250,000	$125,000

The servicing items identified above are not required prior to the City approving development applications within the Abbey Ridge LAP. Volumes for each of the associated roadways and intersections will be monitored by City staff to determine when the respective improvements are required, and will be subsequently listed in Engineering's 10 year Servicing Plan.

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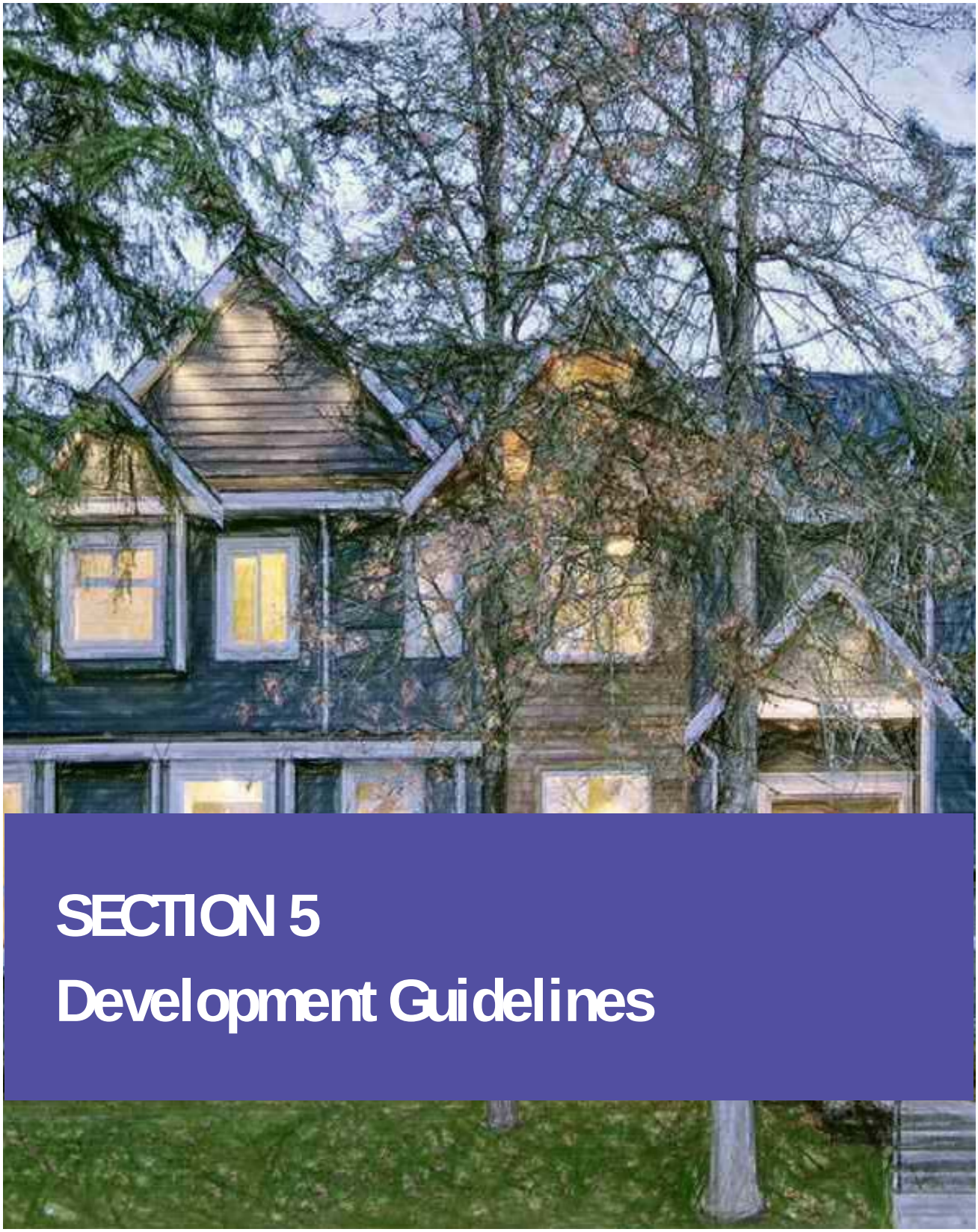


SECTION 5
Development Guidelines

5
DEVELOPMENT GUIDELINES

Development guidelines are to be used in the assessment of development applications in the Abbey Ridge LAP. The guidelines should assist developers and consultants to establish a development rationale and to create improved design associated with new projects, and improvement environmental management.

While not intended for rigid application, the guidelines highlight important considerations which, when appropriately selected and interpreted, can result in safe and useful outdoor places.

5.1 ENVIRONMENTAL MANAGEMENT

With urban development comes increased pressure on natural watercourses and streams. Within the Land use Concept Plan Riparian Buffers have been identified to protect Riparian areas.

The City of Surrey works with the federal Department of Fisheries and Oceans and the provincial Ministry of Environment to ensure that development respects these riparian resources and preserves and enhances them for all residents of Surrey.

Depending on the type of development proposed land dedication (riparian setbacks), restrictive covenants, or landscaping may be required.

Riparian Areas

Regulations and legislation to preserve riparian areas and prevent water pollution are identified the:

- Federal Fisheries Act;
- Provincial Water Act;
- Provincial Environmental Management Act;
- Stormwater Drainage Regulation and Charges By-Law;
- Surrey Zoning Bylaw *(Streamside Protection); and*
- City of Surrey Environmental Sensitive Areas Development Permit Areas.

See Drainage and Environment Section 8, and East Fraser Heights Environmental Study attached in Appendix A-2, as well as contact Planning and Development Department for information on environmental management and riparian area setback requirements and regulations.

Tree Preservation

Future development planning for the area should promote tree conservation to the extent possible. Tree Preservation, Protection, Replacement and Enhancement are the four cornerstones of a sustainable urban forest. The preservation of forests grown mature trees in relation to residential development presents many challenges. Selective preservation of trees from the protected confines of a forest stand often results in unpredictable tree behaviour. The typical tall and thin form of forest grown trees can result in unsuitable candidates to be retained.

There have been significant failures from selective and thin clusters of forest grown trees where preservation has been attempted in the past. Douglas Fir is known to release large limbs when under strong wind loading. The loss of limbs is how the tree responds to wind as opposed to full tree failure. When large Firs shed large limbs, the branches tend to be end weighted and can fall in a vertical spear like orientation. As a result, residential development directly under large mature Firs is not typically recommended.

General Tree Protection Objectives:

- A detailed assessment by a qualified expert should be undertaken for any development applications.
- Tree survey and topographic information must accompany the assessment report.
- Trees on steep slopes, watercourses, ravines and un-developable areas should be retained wherever possible.
- Wind throw and danger trees within the Stream protection and enhancement areas will need to be considered.
- Preserve existing trees, woodlots and natural features wherever possible. Where trees of large size are retained, large groups or wide leave strips are preferred. The seven stands of trees highlighted in the Land Use Concept plan as derived in the East Fraser Heights Environmental Study contained in Appendix A-2 represent some of the better opportunities to retain such groups of trees.
- Provide and enhance landscaping at the street level which contributes to the continuity of landscaping between adjacent properties.
- Stabilize slopes (where existing) with ground cover and trees.
- Select plant materials that are ecologically sound, appropriate for the existing and future site conditions and suitable for all seasons.
- Encouraging the consideration of the location of existing trees in the design of development plans prior to the submission of development applications
- Encouraging and enforcement of tree protection measures during development.
- Encouraging no net loss of trees through the planting of replacement trees.

5.2 CLUSTER HOUSING GUIDELINES

Within the Land Use Concept Plan (Map 3) Cluster Housing Designations Areas have been identified.

These areas allows for the development value (gross residential unit density) associated with one section of a property to be transferred and added to the amount of potential residential units available on another section of a property or development site.

These Cluster Designated Areas:

- **Serve as a mechanism that will help to permanently protects ecologically significant areas (Riparian areas, Significant Tree Patches, and Green Infrastructure) or landscape buffer areas without the expenditure of public funds or long term enforcement of landscape maintenance;**
- **Are applied at a LAP level within prescribed Cluster Designation Areas;**
- **Provides a mechanism that restricts building on portions of land while providing equity to the private landowner in correlation with that restriction;**
- **Promote preservation of green areas while allowing development to occur in predefined designated areas and near service infrastructure.**

Cluster Housing Application Areas

Cluster housing guidelines apply to the two "Cluster Residential" designation areas within West Clayton Neighbourhood.

The two "Cluster Designation" areas (identified and summarized in Section 3) enable the transfer of development potential at rezoning to conserve/enhance or as landscape Buffer Areas, or are biologically significant to improve and protect, to areas specifically designated to be developed.

These include the:

- Low Density Cluster Designation;
- Medium Density Cluster Designation;

These designation areas are provided to enable the redistribution of development potential from one location to another in a way that is fair and equitable to landowners, while supporting community development, landscape buffers, urban planning and environmental management goals.

Example of Cluster Housing at 8 Units Pera Acre with Single Family Development

Density Transfer Areas in Cluster Designations

Green Density Transfer areas in the Cluster Designations refer to the areas of a site where preservation of open space is to occur as identified on the development application plan.

The potential density from the green space transfer areas is intended to be transferred to the "development area" of a site. A formal survey will be required to outline exact location and amount of Green space transfer Areas and they must be identified as such on any subdivision plans.

The following areas or land uses may not be counted as a part of designated green space transfer areas:

- Areas Covered by any Structures or Buildings;
- Road Rights-of-ways;
- Strata Lanes;
- Property Setbacks and private front or backyard areas;

The following areas shall be high priorities for inclusion as designated Green Space Transfer areas:

- Riparian Dedication Setback Areas and Utility Corridors;
- Landscape Buffers separating uses;
- Landscape Buffers;
- Ecologically Significant Vegetation or possible tree preservation Areas shown in the East Fraser Heights Environmental Study);
- Passive Recreation and Trail Areas;
- Biodiversity Hub, Site, or Corridors areas as identified in Surrey BCS;
- Steep or unstable Slopes as identified in the OCP Hazard Land Development Permit;
- Green Infrastructure Network Areas shown in the OCP Environmental Sensitive Areas Maps.

In some circumstances, portions of the Green Space Transfer areas may be conveyed to the City, and/or may be used for public passive or active recreation, community gardens, or rainwater management facilities that meet all design, construction, maintenance, and public safety requirements set forth by the City of Surrey.

Development areas

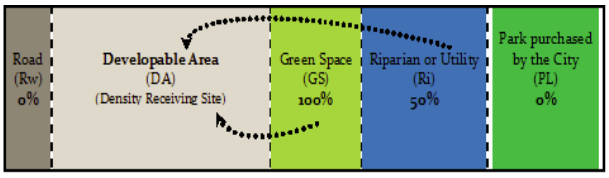
Development Areas refer to the portion of the site where building and development should ideally be located within the Cluster designation.

These areas are intended to be developed more intensely with buildings and structures, so that preservation in the form of buffers, tree preservation or environmental protection areas can occur on other portions of the site. It should be noted that individual Tree protection within Development Areas may still apply, as per the City of Surrey Tree Protection Bylaw.

Determining Cluster Densities

Density Transfer Values for sites with a "Cluster" Designation:

- 100% of site's density designation value from Green Space Transfer Areas
- 50% of site's density designation value from Riparian Areas, Gas, or Hydro ROW Areas;
- 0% from Road Dedication Areas;
- 0% from land purchased for Park by the City



Density Allocation in Cluster Areas

The amount of Green Space preservation required should generally increase with increase in land use density, because of the feasibility of protecting open space and to offset the cost of development.

In the Low density cluster designation, different techniques such as clustering homes into small groups may be used while in higher density urban areas small lots and attached single family dwellings can be used to intensify development in specific locations such as near roads, on flatter slopes, and away from environmentally sensitive features and stands of established trees.

In medium density cluster designation, a range of housing forms including single family, attached, and multiple family homes may be considered if the amount of open space provided allows.

The base and maximum densities in the Cluster designations should meet the requirements outlined in Section 3, including minimum lot sizes permitted. If no green space is provided as part of a development application, all densities shall revert to net developable area of the lot.

Green Space Area Plan Identification

The boundaries of designated green space areas, recreation areas, rainwater management facilities, and natural areas shall be clearly delineated on plans, including subdivision plans, rezoning plans, and marked in the field with signage during construction approved by the Surrey Planning and Development Department to distinguish these areas from private or common property.

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SECTION 6
Implementation Strategies

6
IMPLEMENTATION STRATEGIES

This section contains general implementation measures included in the adoption of the Local Area Plan for Abbey Ridge.

6.1 LAND CONSOLIDATION

Lot consolidation may result in the more equitable development of multiple parcels of land.

Lot consolidation may ensure that:

- **future development results in the most efficient development of properties;**
- **dedication of strategic road connections supports the plan objectives;**
- **construction of off-site works and services costs are distributed equitably among developments;**
- **small acreage and irregular shaped lots have equitable development potential.**

Consolidation Areas

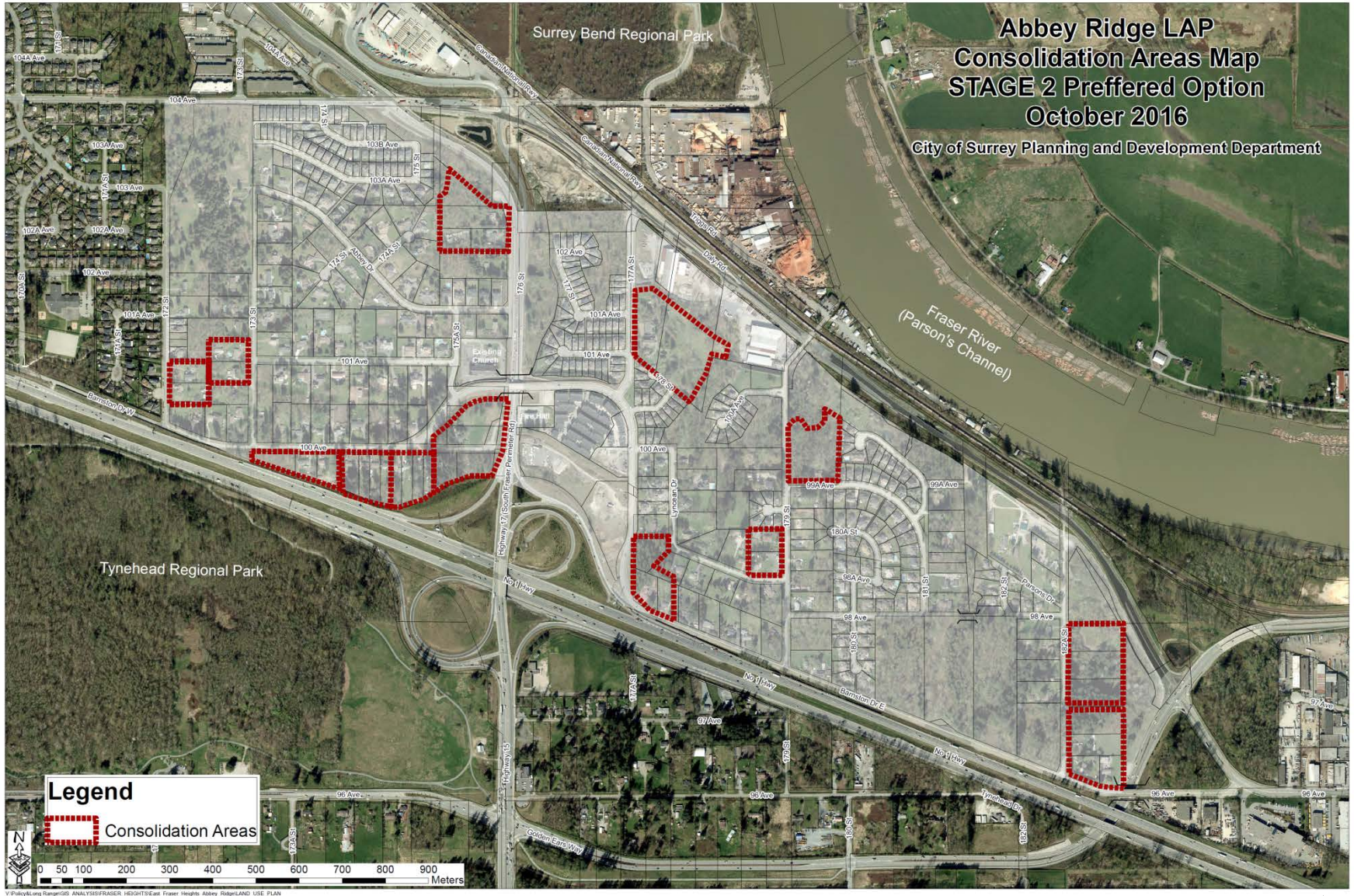
In a few areas of the LAP as illustrated in Map 7 identify where lot consolidation may be required to ensure efficient development of properties. These land consolidation opportunities will, in most circumstances, be determined on a case-by-case basis at development application stage dependant on the type and for of development proposed.

In some cases, consolidation requirements have been identified in the Land Use Plan to avoid creating remnant pieces created by fragmented ownership that would not be developable on their own or limit the development potential of an adjoining lot.

Land consolidation areas have been generally identified to inform developers and owners of the consolidation strategy guidelines, to ensure compatibility and feasible development areas, and to achieve an equitable distribution of road dedication and construction costs across properties.

If land consolidation is NOT proven to be possible or feasible during the development process, the developer must:

Demonstrate that the development potential of the excluded property is not compromised to the satisfaction of the City.



Map 7 - Abbey Ridge Proposed Consolidation Areas

6.2 DEVELOPMENT APPLICATION PROCEDURES

Official Community Plan Designations

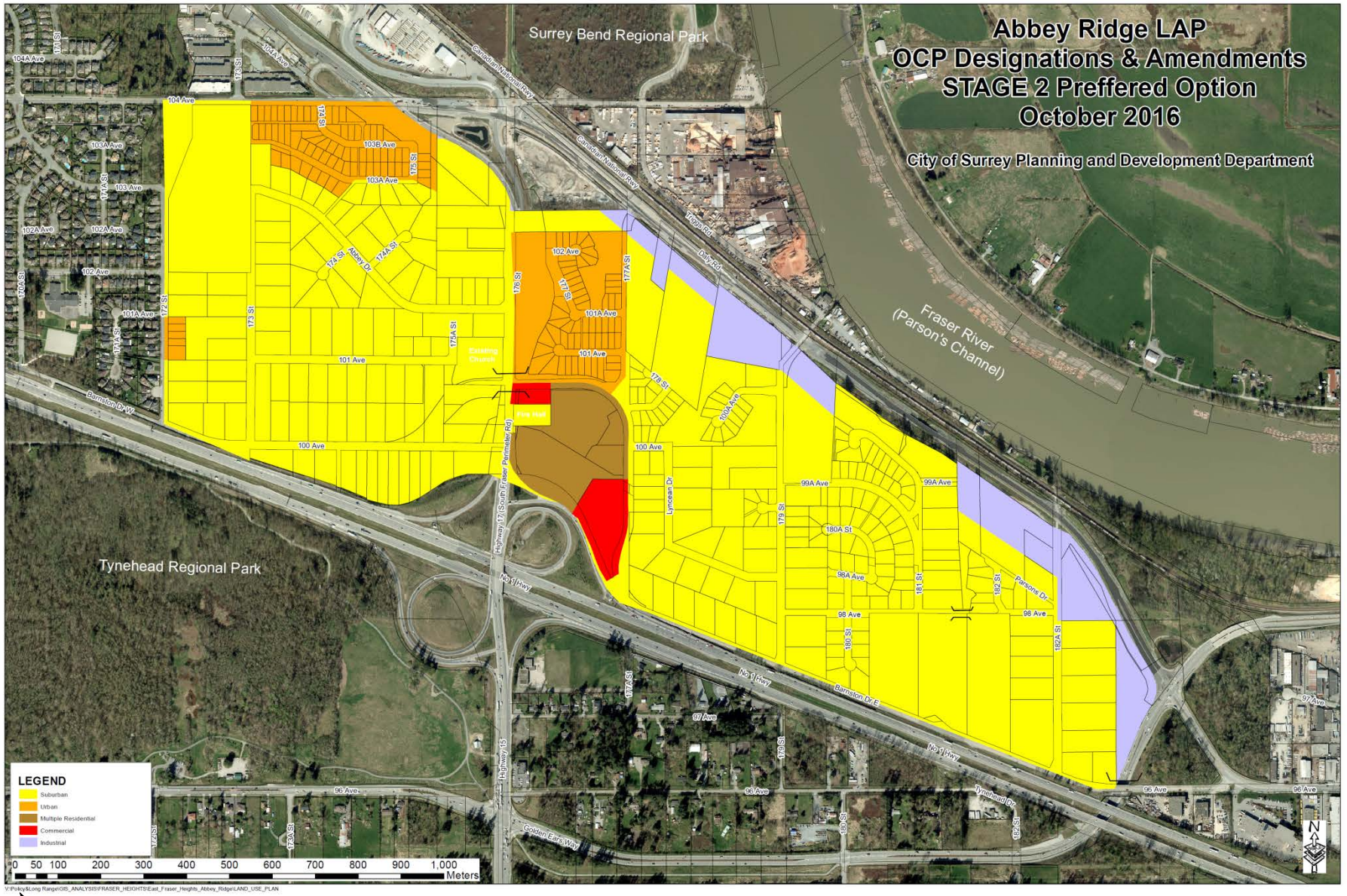
The current OCP designation and the existing zoning in many portions of the LAP may not permit the development of the densities envisioned in the Abbey Ridge Land Use Concept plan, as illustrated in Map 8.

As such, the plan densities envisioned will occur through individual land development applications brought forward by owners and/or developers that will include an OCP amendment, rezoning and subdivision consistent with the land uses and densities set out in the a Council approved Land Use Concept.

A projection of future OCP Designation boundaries is provided for general reference purposes in Map 9.

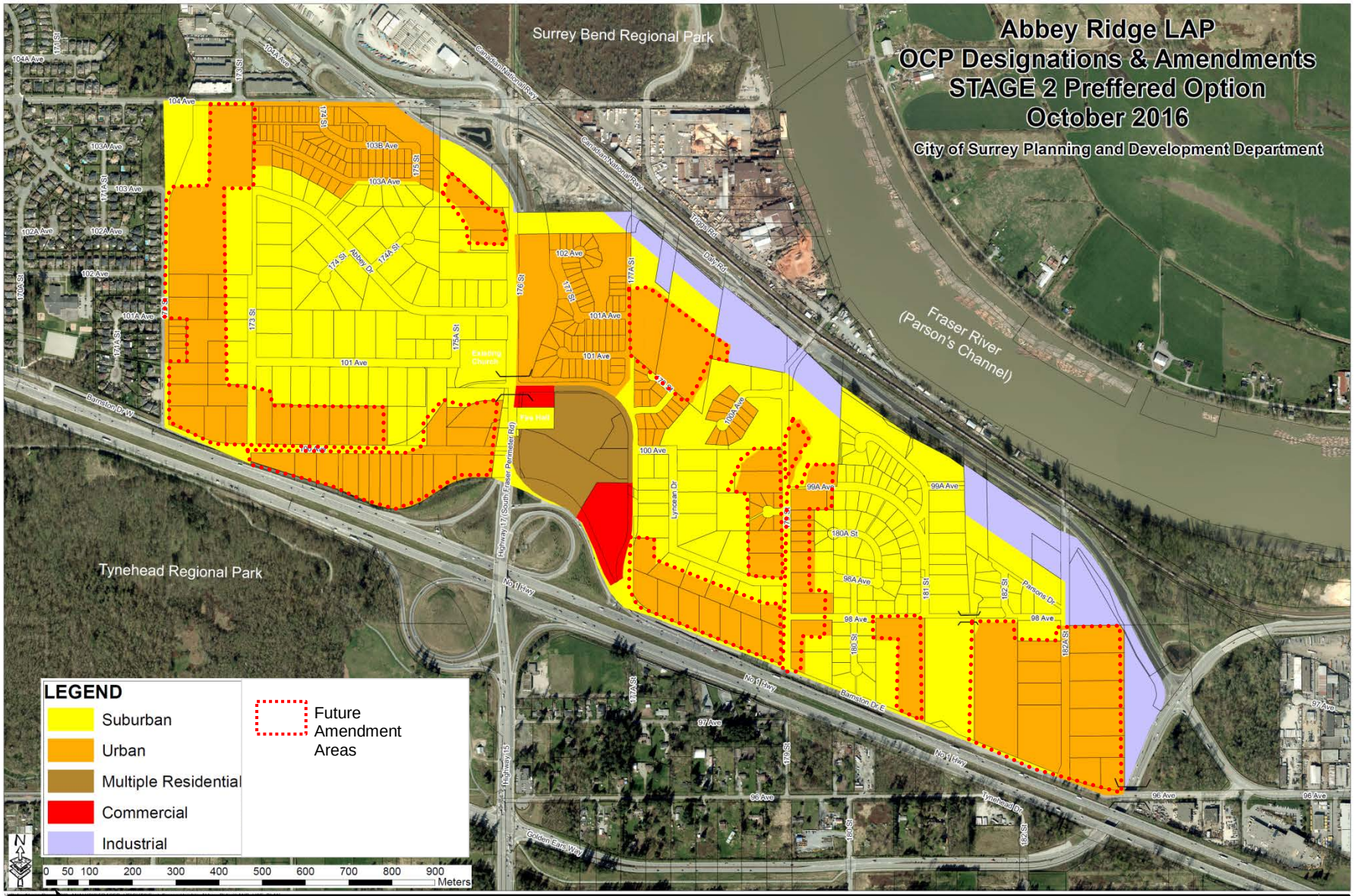
Parks and Greenways

The public elements of the LAP (parks, streets and greenways) will be secured through the development approval process by dedication, land conveyance or by purchase with funds generated from development in the area or through other agreements.



CITY OF SURREY

Map 8- Abbey Ridge OCP Designations (Existing Conditions)



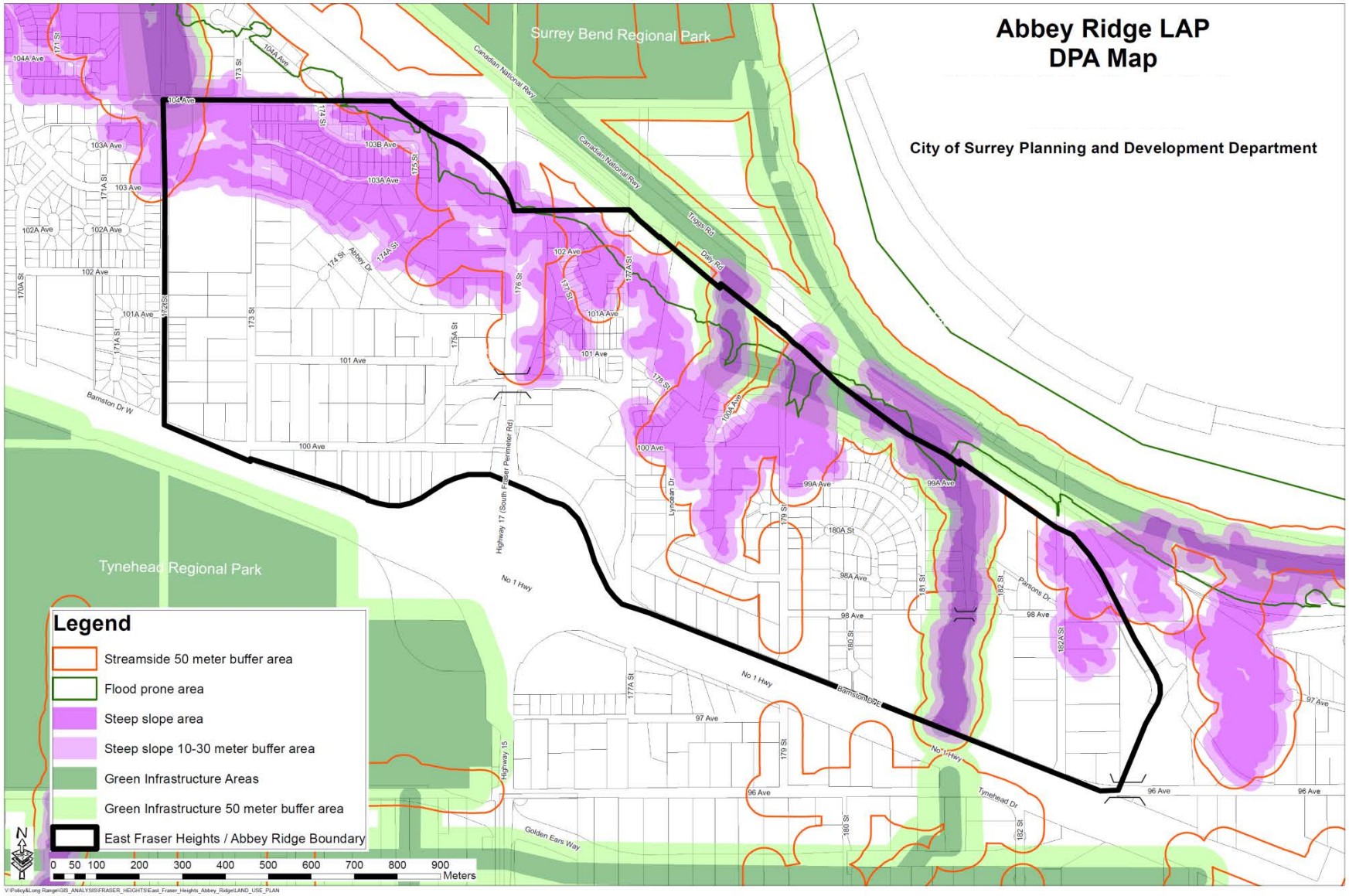
CITY OF SURREY

Map 9- Abbey Ridge OCP Designations (Anticipated Future Conditions)

Development Permit Areas

Where developments are located in designated Development Permit Areas as identified in the Surrey Official Community Plan (such as Hazard Lands and Sensitive Ecosystem areas) as well as in the case of multiple unit residential developments or commercial developments, the Official Community Plan Design Guidelines will be implemented through the process of reviewing and approving the related Development Permit at the time of development application review and approval.

The Environmental and Hazard Land Development Permit areas applicable to the Abbey Ridge LAP area shown in Map 10, for general reference purposes. Map 10 is shown for information purposes only and confirmation of exact OCP requirements to be made as part of future development applications.



Map 10 - Abbey Ridge Development Permit Areas

6.3 CONTRIBUTIONS FOR COMMUNITY AMENITIES AND SERVICES

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

To enact amenity contribution requirements for development within the LAP (described later in this section) the Surrey Zoning By-law will need to be amended to add Abbey Ridge to the list of Secondary Plan Areas within which monetary contributions are required.

The monetary contributions toward police, fire and library will offset the capital costs of providing these services to the new development and are applied on a standardized basis in all of Surrey's Neighbourhood Plan areas.

The monetary contributions toward parks, open spaces and pathway development are based upon an estimate of the capital costs of these improvements for this particular LAP area. The total 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.

The amenity contributions noted above are payable upon subdivision for single-family subdivisions or upon issuance of building permits for multiple development and other uses.

The estimated costs of the various amenities are distributed evenly to each dwelling unit. Therefore, if the number of dwelling units in a proposed development is lower than that anticipated by the LAP, the applicant will be expected to "top up" the amenity fees based on the number of the dwelling units used to calculate the amenity charge to ensure that there is no shortfall in the funding for the proposed.

Amenities and Services

Parks Development

The scope of parkland development within the Abbey Ridge LAP will include an expanded Neighbourhood level park, an expanded Natural Areas Park, one new neighbourhood level park and three new Natural Area Parks, in addition to an expansion of the city's linear greenway network.

The estimated cost of developing park amenities is approximately $1,613,200.00, which results in a $1,480.00 (in 2016 dollars) per dwelling unit. This estimate includes the construction of on-site park amenities, such as playgrounds, Trail Bridge, washroom buildings, parking lots, sports courts, athletic fields, tree and horticultural plantings, park pathways and on-site plazas, seating areas, viewing platforms and passive open spaces. This also includes natural and riparian area management within land acquired by Parks.

Park amenity calculations do not include riparian area works on land conveyed to the City through the development process, such as invasive species removals, fence construction, replanting and naturalization, in-stream works and any other related riparian area costs, including planning and design costs, which are to be accounted for as part of the development process and subject to the Streamside Protection regulations.

Library Services

A study of library requirements in Surrey's new neighbourhoods has established that a contribution of $146.58 (in 2016 dollars) per dwelling unit (non-residential development is exempt) is necessary to cover the capital costs for library materials and services, which is sensitive to population growth. Consequently, a total of approximately $159,772.20 will be collected from Abbey Ridge towards materials such as books, computers and CDs.

Fire Services

Future development in this neighbourhood will drive the need to upgrade existing fire protection facilities. A study of fire protection requirements in Surrey's new neighbourhoods has established that a contribution of $65.16 per dwelling unit and $1,125.83 per acre of non-residential development (in 2016 dollars) will cover the capital costs for fire protection. This will result in a total capital contribution from Abbey Ridge of approximately $330,242.44 toward fire protection.

Police Services

Similar to Fire Services, a contribution of $65.16 per dwelling unit and $260.65 per acre of non-residential development will cover the capital costs for police protection. This will result in a total capital contribution from Abbey Ridge of approximately $76,453.74 toward police protection.

Summary of Fees

The Amenity Contributions rates are summarized in Table 5, and are derived from the average densities proposed in the residential designations of the Abbey Ridge LAP and the number of dwelling units (excluding any secondary suites) that are anticipated.

Table 5 - Summary of Amenity Contributions for Abbey Ridge LAP amenities

ABBEY RIDGE LAP COMMUNITY AMENITY CONTRIBUTIONS			
	Per Unit Contribution All Residential **(Approx. 1,090 new dwelling units @ average density)**	**Per Acre Contribution All Non-Residential Uses**	**Anticipated Total Revenue at Build Out**
Police Protection	$65.16 per dwelling unit	$260.65 per acre	$71,024.40 Residential $5,429.34 Non-Residential
Fire Protection	$281.46 per dwelling unit	$1,125.83 per acre	$306,791.40 Residential $23,451.04 Non-Residential
Development of Parks	$1,480.00 per dwelling unit	n/a	$1,613,200.00 Residential
Library Materials	$146.58 per dwelling unit	n/a	$159,772.20 Residential
Total Contribution (per unit or per acre)	$1,993.20 per dwelling unit	$1,386.48 per acre	$2,201468.38
Anticipated Total Revenue			**$2,201,468.38**

PART B

Engineering Servicing

SECTION 7
Financial Plan Summary

7
FINANCIAL PLAN SUMMARY

This section outlines the anticipated Development Cost Charge (DCC) revenues and construction costs for DCC eligible infrastructure to support development in the Abbey Ridge LAP.

Section 7 summarizes into one location all the financial costs for engineering related costs of development. This section lists and cross-references costs in the following sub-sections and sections.

- Section 4 Transportation
- Section 8 Drainage and Environment
- Section 9 Sanitary Sewer
- Section 10 Water

7.1

FINANCIAL ANALYSIS FOR ENGINEERING INFRASTRUCTURE

Development Cost Charge Revenues and Eligible Construction Costs

Table 6 summarizes the anticipated Development Cost Charge (DCC) revenues and construction costs for DCC eligible infrastructure to support development in the Abbey Ridge LAP. The anticipated DCC revenues are based on the City-wide DCC rates that came into effect on May 16, 2016. The DCC revenues are sufficient to fund the DCC eligible engineering infrastructure upgrades required, as documented within this report.

Error! Reference source not found. shows the estimated DCC Revenues and Costs Attributed to Growth (DCC Eligible Costs) The DCC revenues shown in Table 5 include the Municipal Assist Factor (MAF) (10% for utilities and 5% for transportation).

Table 6- Estimated DCC Revenues and Costs Attributed to Growth (DCC Eligible Costs)

Service	Estimated DCC Revenues	Costs Attributed to Growth (DCC Eligible Costs)
Drainage & Environment	$ 3,797,000	$ 578,000
Sanitary Sewer	$ 2,488,000	$ 2,340,000
Water	$ 1,924,000	$ 942,000
Arterial Roads	$ 11,277,000	$ 6,600,000
Collector Roads	$ 2,961,000	$ 2,900,000

7.2 10-YEAR SERVICING PLAN

The City's 10-Year Servicing Plan itemizes the City's capital expenditure plan for engineering infrastructure to service existing development and support new growth.

Table 7 summarizes the engineering infrastructure improvements within the Abbey Ridge LAP boundary that are included in the City's current 10-Year (2016-2025) Servicing Plan. Some of these projects are related to the Anniedale – Tynehead Neighbourhood Concept Plan (NCP) (located immediately south of the Abbey Ridge LAP), which requires off-site infrastructure to be built in Abbey Ridge to support development in the NCP area.

Infrastructure upgrades identified in this report for Abbey Ridge are eligible for inclusion in subsequent updates of the City's Ten Year Servicing Plan.

Table 7 - Projects in Current 10 Year (2016-2025) Servicing Plan

PTS ID	Utility	Location	Project Description	Cost
15238	Storm	Lyncean Creek West: Lyncean Dr – Daly Rd	Environmental Enhancements	$ 35,000
13195	Sewer	173 St: Hwy 1 – 104 Ave	800m of 600mm diameter	$ 785,000
13197	Sewer	Hwy 1 / 173 St crossing		$ 253,000
11280	Sewer	173 St / 104 Ave	Odour Control Facility	$ 667,800
15184	Sewer	104A Ave: lot 17337	Big Bend Pump Station relocation	$ 7,500,000
9716	Water	103 Ave: 172 St – 173 St	280m of 400mm diameter	$ 98,000
9717	Water	100 Ave: 177 St – 180 St	580m of 400mm diameter	$ 261,000
9718	Water	98 Ave: 181 St – 182A St 182A St: 96 Ave – 98 Ave	700m of 400mm diameter	$ 315,000
13174	Water	Hwy 1: 168 St – 173 St	1,060m of 450mm diameter	$ 901,000
13271	Water	Hwy 1 / 173 St crossing		$ 400,000

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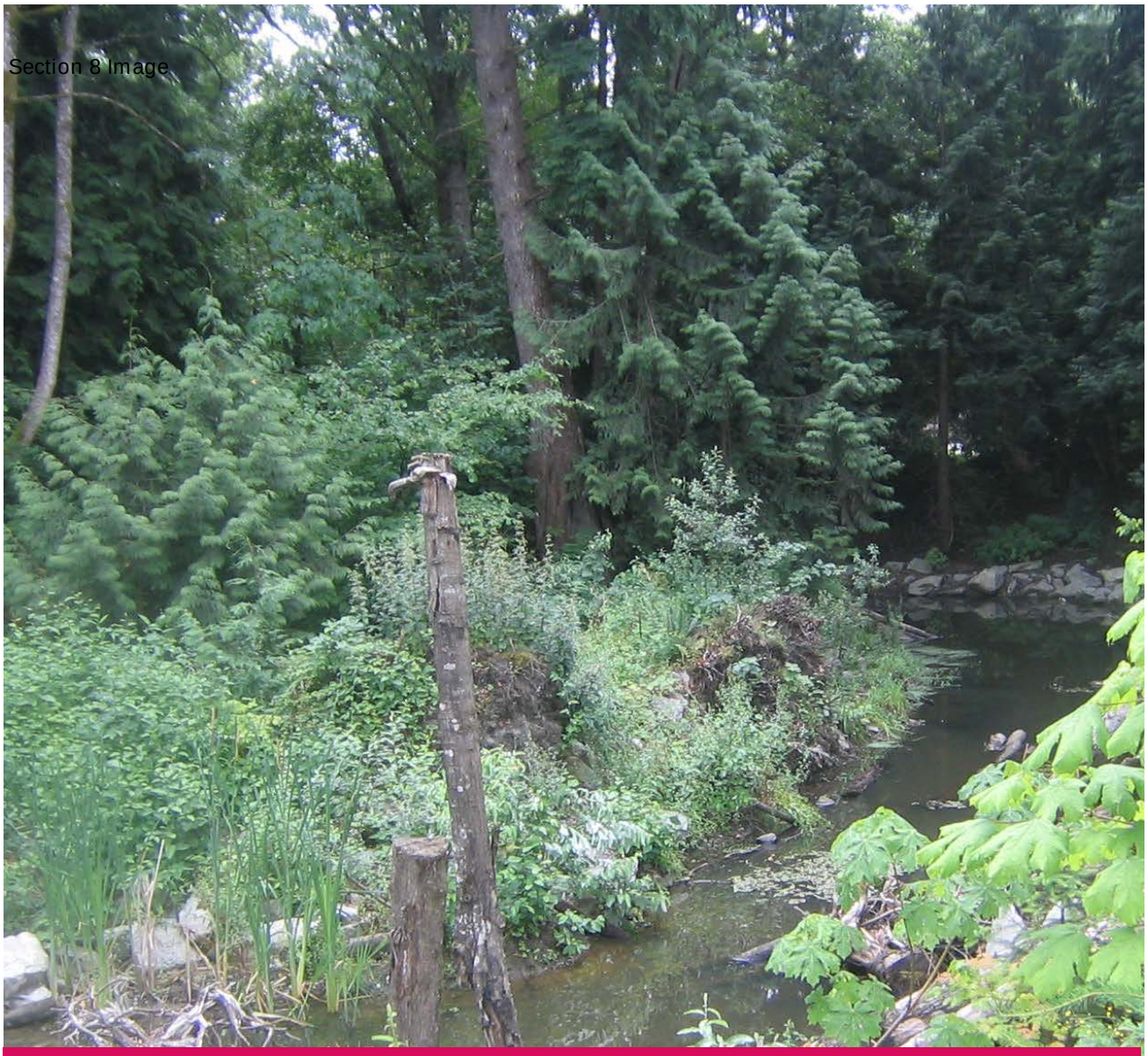


SECTION 8
Drainage and Environment

8
DRAINAGE AND ENVIRONMENT

This section describes existing drainage and environmental conditions, and identifies the stormwater infrastructure required to service the Abbey Ridge LAP.

8.1 EXISTING STORMWATER SERVICING

Existing Watersheds

The two major watersheds within the Abbey Ridge LAP area are Big Bend and Port Kells, each containing various sub-catchments. The Big Bend watershed is comprised primarily of urban and suburban residential developments that drain northeast. The piped system discharges to multiple tributaries along the escarpment that discharge to the lowlands and drain into Surrey Bend Regional Park via Centre Creek. The Port Kells watershed is made up two distinctive halves with only the western half from Golden Ears Way within the Abbey Ridge area. Runoff from this area drains north to the Fraser River via one of three major watercourses: Lyncean Creek West, Lyncean Creek East, and Leoran Brook. Map 11 shows the existing drainage system for Abbey Ridge.

Drainage Infrastructure

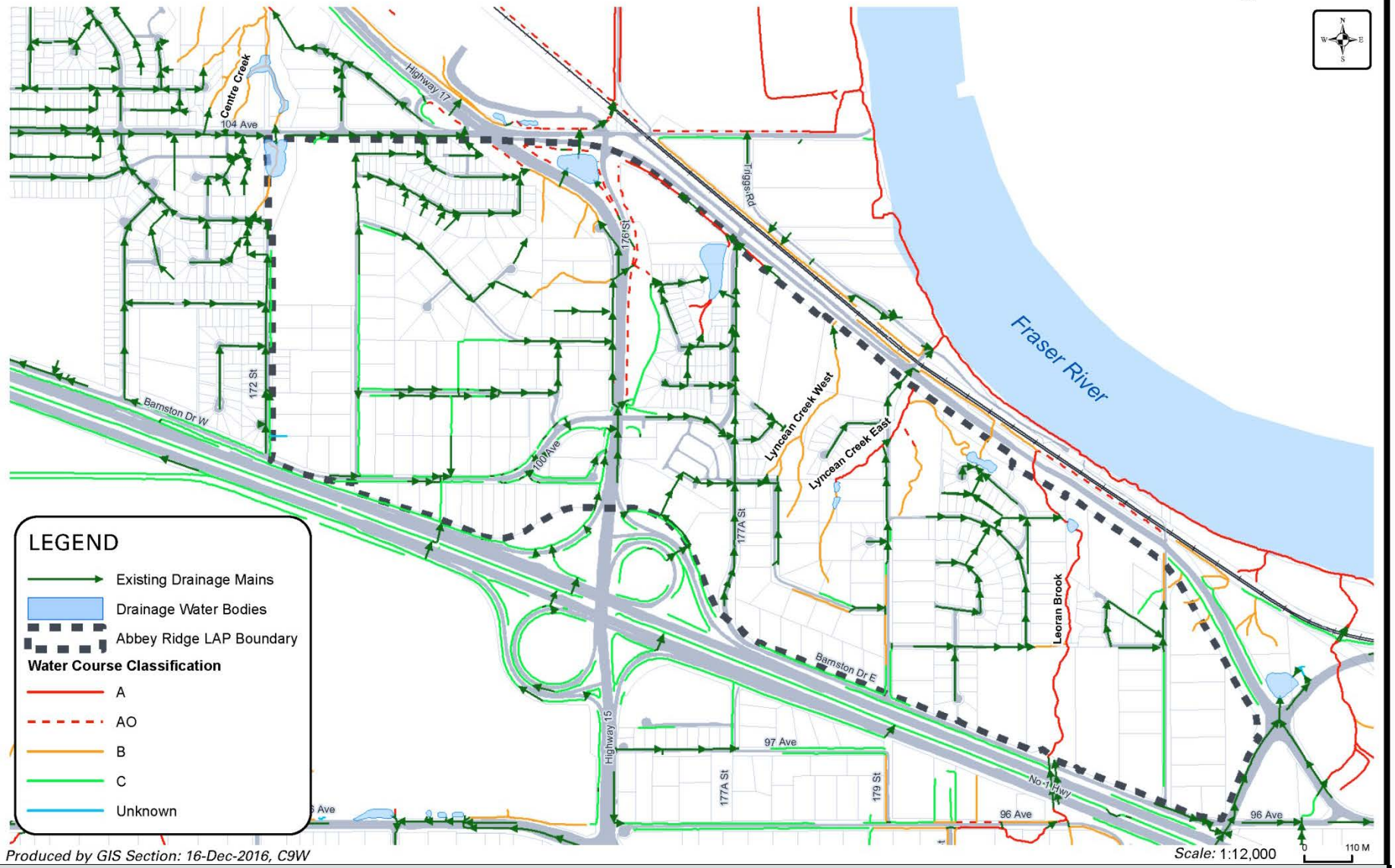
The drainage infrastructure within the LAP area is predominantly open channels, storm sewers, and culverts. Many of these existing storm sewers will be maintained and utilized with some upgrades as needed to provide capacity for future development. There are three existing detention facilities in the Abbey Ridge LAP: a pond at 172 Street and 104 Avenue; a water quality pond at 104 Avenue and 176 Street; and an oversized detention pipe at 177 Street and 102 Avenue. In addition, there are additional ponds in the area constructed as fish habitat compensation sites.

Current erosion sites are identified along Leoran Brook, Lyncean Creek West and Lyncean Creek East. Additional sites are also found in a roadside ditch on 182A Street and in Centre Creek. In general, these identified erosion sites are considered low risk with the recommendation of continual site review and monitoring.

Environment

Watercourses and wetlands have been identified in the Abbey Ridge LAP. Lyncean Creek (West and East) and Leoran Brook are natural streams that flow through the area plus a number of unnamed creeks that also run downslope towards the Fraser River. Due to this connection with the Fraser River, several watercourses including roadside ditches within the study area are identified as fish bearing or provide overwintering habitat for fish. The riparian area of Leoran Brook is designated as a terrestrial corridor connecting fragmented patches of forest habitat within the development area to portions of Surrey Bend Regional Park.

Further details on existing drainage and environmental conditions can be found in Appendix A-2.



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Map 11 – Existing Drainage System

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8.2 DESIGN CRITERIA AND ANALYSIS

Design Criteria

The City's Design Criteria Manual (2016) specifies design and performance standards for stormwater systems. The primary criteria for stormwater networks are:

- In areas where the properties do not have basements, provide a storm sewer system (minor system) with capacity to convey the post-development peak flows from the 1:5-year return period storm and a major system with enough capacity to accommodate the peak flows from the 1:100-year return period storm.
- In areas where the properties have basements, provide a storm sewer system (minor system) with capacity to convey the post-development peak flows from the 1:100-year return period storm.

Minor system storm sewers are pipes with a contributing catchment area of less than 20 hectares (ha); major system is a storm sewer or open channel with a catchment area greater than 20 ha.

The City recently updated the Design Criteria Manual in January 2016. The City's Design Criteria Manual is updated from time to time to maintain current design standards and best practices. Future design of the stormwater system for the Abbey Ridge LAP must use the Design Criteria Manual that is current to the day of the design.

Analysis

Baseline conditions were established at several points of interest to compare peak flows and runoff volumes due to development. These general requirements described above result in the following specific requirements for the Abbey Ridge area:

- Provide a piped system for the major flow in areas that currently have or are expected to have basements.
- Control the post-development flows and volumes at or below pre-development conditions in areas where erosion is a concern.
- Implement Low Impact Development (LID) practices to attenuate post-development peak flows at the various erosion sites and improve water quality.
- Provide a drainage strategy that will not overload the culverts crossing the Golden Ears Connector.

8.3 PROPOSED SYSTEM

Recommended Infrastructure Improvements

The future development of Abbey Ridge will change the existing land use, increase the amount of impervious areas, reduce infiltration, and increase surface runoff. The overall approach for the proposed drainage system is to assess the existing system's performance and determine necessary upgrades to adequately convey runoff from the study area to the Fraser River.

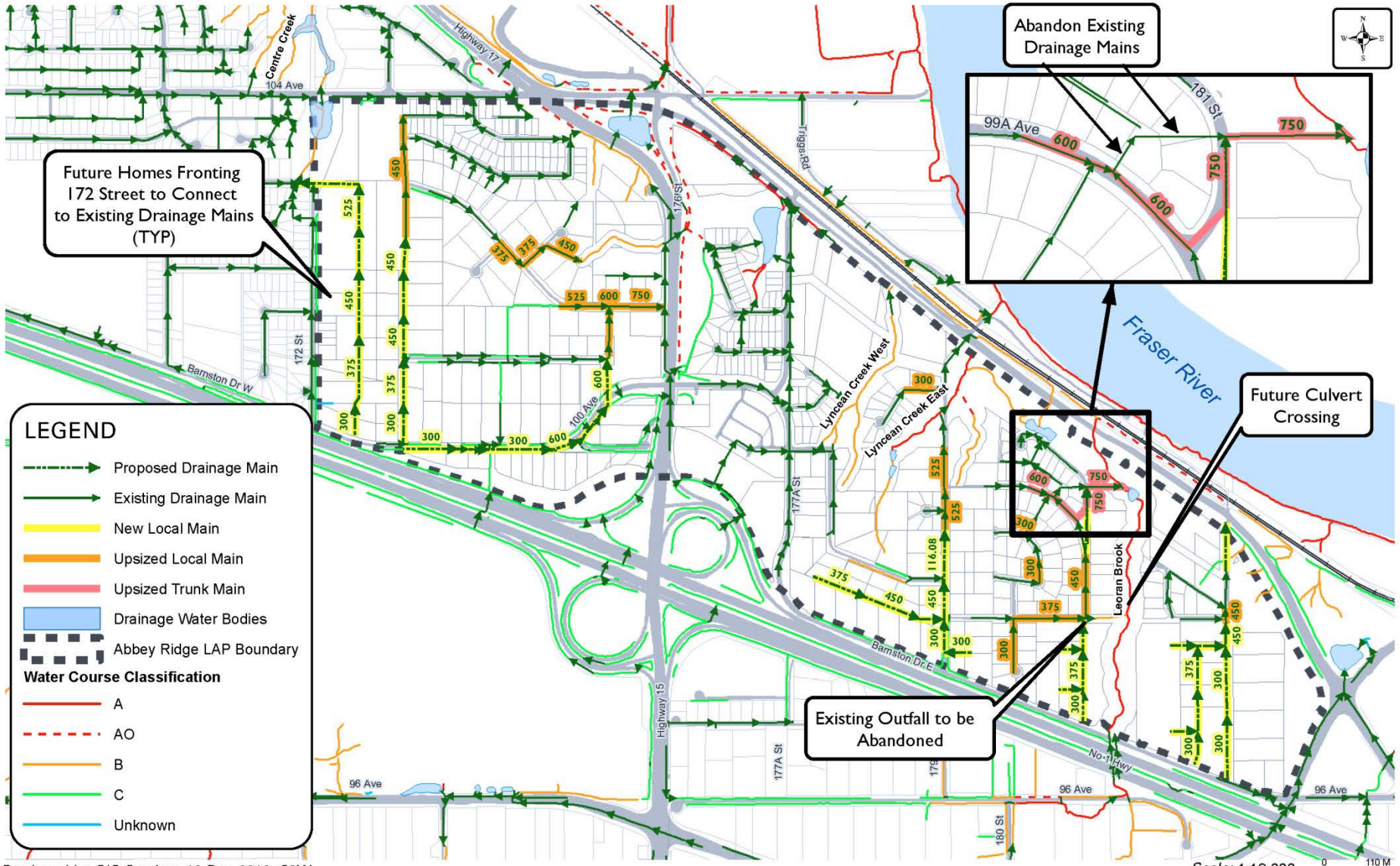
Hydraulic modelling of the existing drainage system revealed that many of the storm sewers do not have capacity to accommodate current or increased flows. Therefore, in addition to extending the existing storm sewer system, many of the existing pipes must be replaced to prevent flooding of existing properties. Additional detention ponds were not identified as a significant portion of the study area is already developed.

In order to attenuate flows, the future discharges on Leoran Brook and Lyncean Creek East should be limited through the use of Low Impact Development (LID) techniques in future roads and developments to reduce volume rates and as the primary erosion mitigation measure in sensitive areas.

Future developments are expected to install storm sewers to service their respective development and connect to the downstream storm sewer system. A major flow route must also be provided along the surface by installing curb and gutter along roadways. This will provide a safe route for flows that exceed the capacity of the piped system without flooding adjacent properties.

New storm sewers and upgrades to the existing system are required in many areas. Upgrade and re-alignment of existing trunk sewers are required on 99A Avenue and 181 Street to provide sufficient capacity and an additional outfall to Leoran Brook will also be required. The works include abandonment of the existing trunk sewer behind the existing homes on 99A Avenue and 181 Street.

Map 12 identifies the major system storm sewers recommended for upgrade.



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Map 12 – Proposed Stormwater System Servicing Plan

On Lot Requirements

The following on-lot measures and LIDs to retain rainwater at the source along with water quality enhancements are recommended:

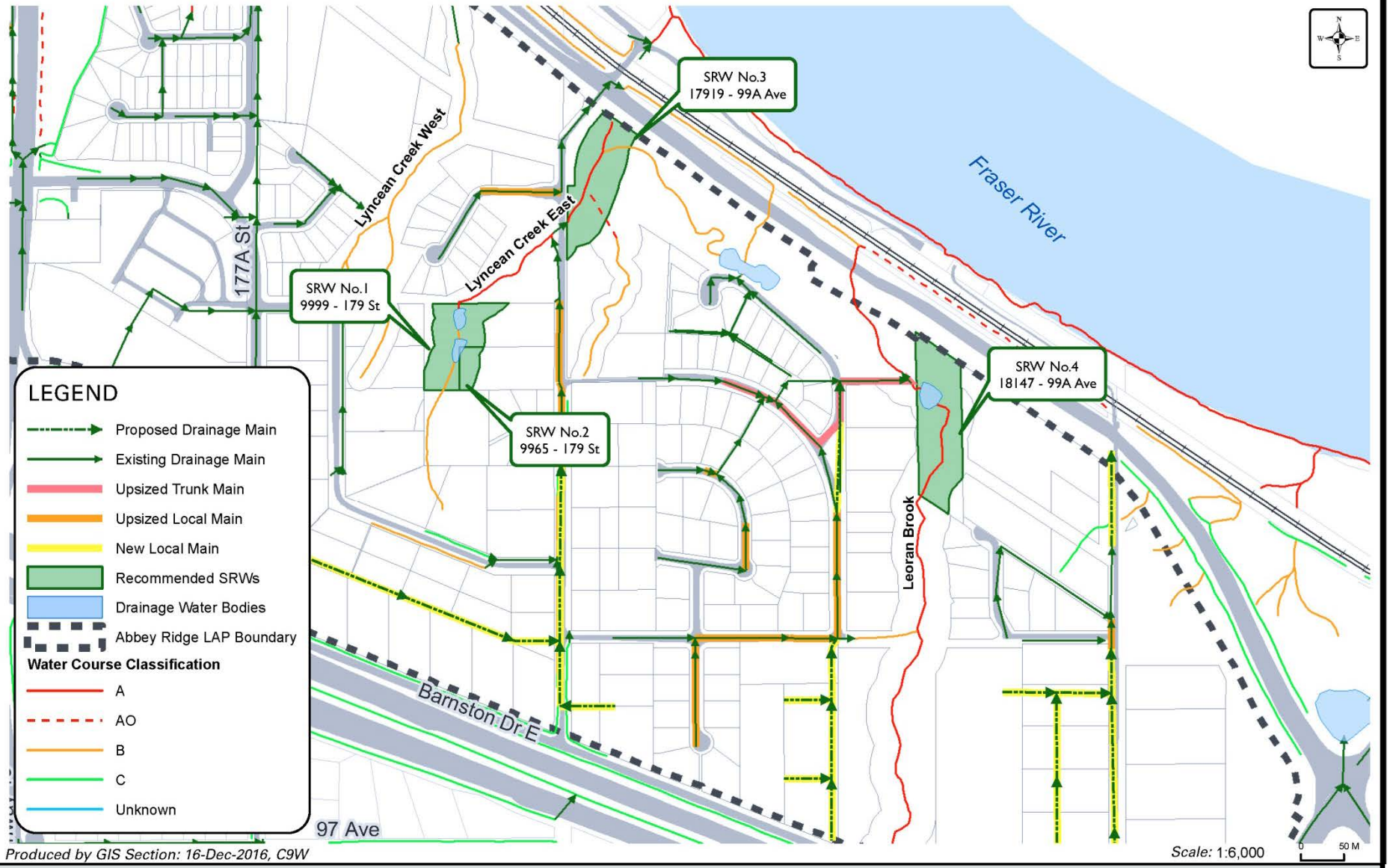
- All new industrial, institutional, commercial, and multi-family residential development will provide on-site detention storage to limit off-site runoff discharge to 15 l/s/ha for the 5-year storm and 25 l/s/ha for the 100-year storm.
- All land uses to provide 450mm of enhanced topsoil on all pervious areas.
- LID measures are required for road runoff. Road LIDs recommended are 450mm of topsoil for boulevard areas, grading sidewalks towards the boulevard, and infiltration galleries or rain gardens that occupy 5% of the road or lane area.
- Water quality treatment for multi-family sites.
- Oil-grit traps on roadway catch basins.
- Where applicable, establish riparian setbacks to comply with the Riparian Area Bylaw.

Erosion Mitigation

There are several sites in Abbey Ridge where erosion is a potential concern. However, there are no identified sites for immediate remediation. The primary mitigation measure for erosion in this LAP is to control the peak discharge rates and total runoff volumes through the use of on-lot LID measures and the continued operation of the existing detention facilities.

While some stretches of Lyncean Creek West, Lyncean Creek East, and Leoran Brook flow through lots owned by the City, other stretches flow through private property. The acquisition of Statutory Right-of-Way (SRW) for these stretches is recommended and is shown on Map 12. These identified SRW requirements are along fisheries watercourses and would encompass all of the streamside riparian area encumbered by the sensitive ecosystem setback.

Further details can be found in Appendix A-2.



Map 13 – Recommended Statutory Right of Ways

8.4 COSTS AND FINANCING

Storm sewer upgrades identified to service the Abbey Ridge LAP area are summarized in Table 8. These are major system trunk sewer upgrades required for development in Abbey Ridge and their costs can be attributed to growth. Costs for minor system storm sewers, with catchment areas less than 20 ha, are not included in this cost summary.

Table 8 – Stormwater Infrastructure Required to service the Abbey Ridge LAP (DCC Eligible)

Location	Length (m)	Size (mm diameter)	Cost Attributed to Growth (DCC Eligible Costs)
Storm sewer on 99A Avenue and 181 Street	106	600	$202,000
	123	750	$281,000
Outfall at 99A Ave and Leoran Brook			$95,000
		TOTAL	$ 578,000

Notes:

- Costs are as of December 2016
- Costs include engineering (12%), and contingency (15%).
- These cost estimates are based on the City's previous project experience. Actual costs may vary depending on unforeseen project design requirements, construction and economic market conditions, local interest in the project(s) and currency fluctuations.

Further details can be found in Appendix A-2.

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SECTION 9
Sanitary Sewer

9
SANITARY SEWER

This section describes existing sanitary sewer conditions and identifies the sanitary infrastructure required to service the Abbey Ridge LAP.

9.1 EXISTING SEWER SERVICING

Existing Sewer Infrastructure

The Abbey Ridge LAP area is currently serviced by the Big Bend Trunk Sewer (BBTS) and the Big Bend Pump Station (BBPS). The BBTS runs from east to west through Abbey Ridge, roughly following the 20 metre elevation contour. Originally constructed in 1977, the BBTS ranges from 600mm diameter to 750mm diameter in size, and contains both PVC and concrete pipe segments. Aside from servicing Abbey Ridge, the BBTS also conveys wastewater flows generated by the Port Kells industrial area to the east via the Port Kells pump station and a 500/400mm diameter forcemain, which discharges to the BBTS near the 18400 block of 96 Avenue.

The BBTS conveys flows to the BBPS, located at 176 Street and 104 Avenue, which in turn pumps wastewater west to Metro Vancouver's North Surrey Interceptor (NSI) via a 400/300mm diameter forcemain on 104 Avenue. The BBPS is within the 200 year floodplain of the Fraser River and is susceptible to flooding during freshet conditions. Given this risk, the City is currently undertaking the design to relocate the BBPS to a higher elevation. Once relocated, the BBPS will continue to discharge wastewater flows to the NSI.

Existing Servicing

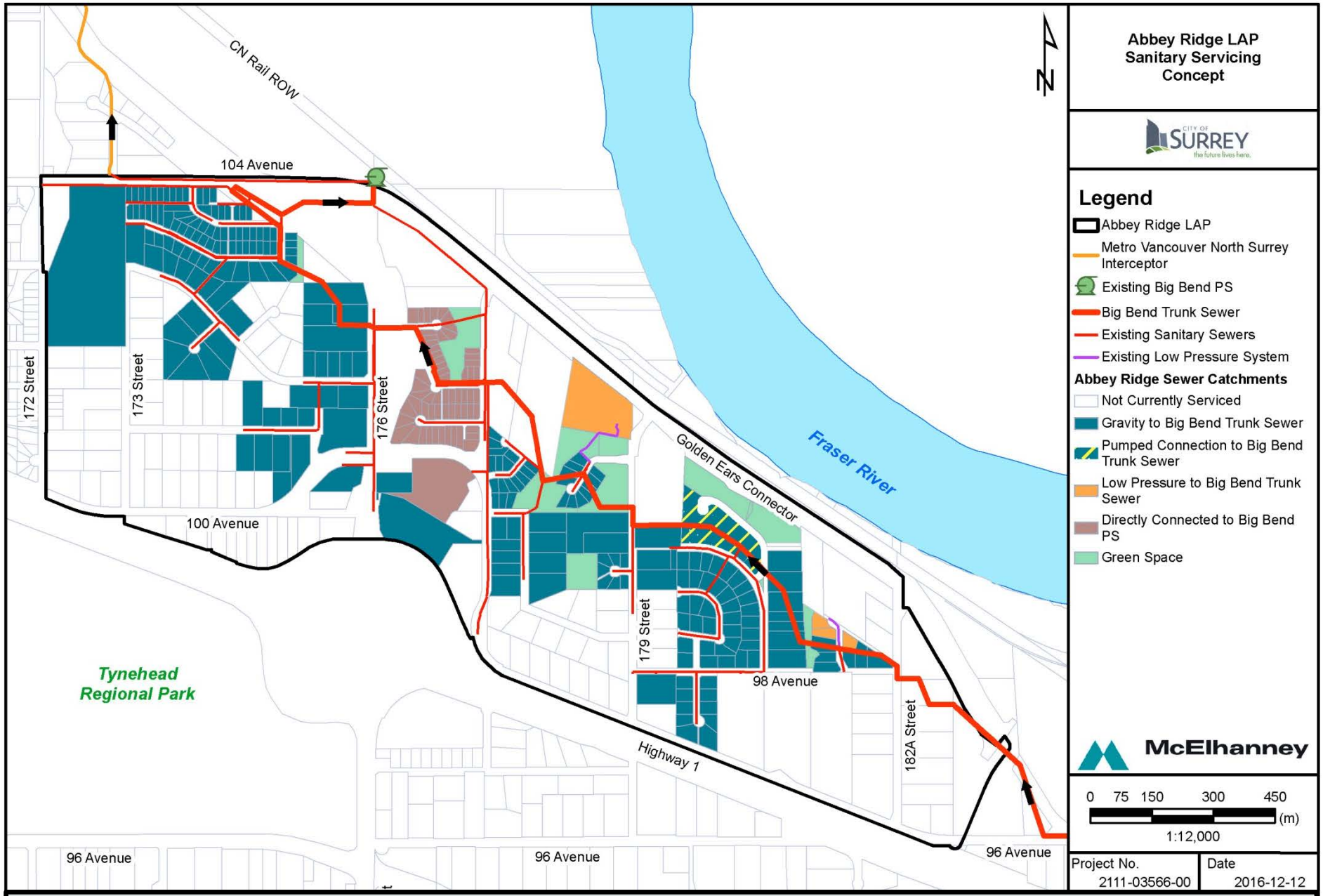
Existing development in Abbey Ridge is serviced in a variety of different ways. Several properties situated south of the BBTS are serviced by a 200mm diameter to 250mm diameter gravity sewer network that connects to the BBTS at several locations along its length. Properties south of the BBTS that are not serviced by the gravity sewer network rely on private on-lot septic field systems for wastewater treatment and disposal.

North of the BBTS, properties are either serviced by low pressure sewer (LPS) systems (since these properties are lower in elevation than the BBTS, they cannot be serviced by gravity sewers) or by private on-lot septic field systems. There is a pocket of existing development on the west side of 177A Street that is serviced by a gravity sewer that is directly connected to the BBPS via an alignment along the Golden Ears Connector. There are also several homes on 99A Avenue and 181 Street that have direct pumped connections to the BBTS.

The BBTS has flow capacity constraints under existing development conditions. The planned increase in development activity, the need to provide sanitary services to all developable lots within Abbey Ridge, and future build out of the Port Kells industrial area will contribute to further capacity issues within the BBTS. Many of the constrained sections are located in rear and side yards within narrow right-of-ways, making it challenging to repair or upgrade the BBTS along its current alignment to address capacity issues. Topographical constraints also make it challenging to consider an alternate alignment for the BBTS without significant impacts to existing development.

The existing sanitary infrastructure in Abbey Ridge and currently serviced areas are shown on Map 14. This infrastructure will need to be extended and upgraded to accommodate future development in Abbey Ridge.

Further details on existing sanitary infrastructure in Abbey Ridge can be found in Appendix A-2.



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Map 14 - Big Bend Trunk Sewer Catchments (Existing Conditions)

9.2 DESIGN CRITERIA AND ANALYSIS

The City's Design Criteria Manual (2016) was used to establish the sanitary sewer servicing criteria for Abbey Ridge. Key sewer design criteria are summarized below:

Design Flow Generation

- Average Dry Weather Flow (ADWF) of 350 L/capita/day
- Peaking factor (PF) as per Harman's formula
- Inflow and Infiltration (I&I) allowance rate of 11,200 L/hectare/day

Pipe Capacity / Sizing

- Mannings "n" of 0.013 for all pipes (local and trunk)
- Sewers designed to convey Peak Wet Weather Flow (PWWF)
- Existing sewer capacity assessed using Qdesign/Qfull capacity = 0.70 (or 70%) for sewers with PWWF less than 40 L/s, and Qdesign/Qfull capacity = 0.837 (or 83.7%) for sewers with PWWF greater or equal to 40 L/s
- Minimum velocity of 0.6 m/s at 70% Peak Dry Weather Flow (PDWF) for new gravity sewers

Population projections for Abbey Ridge were provided by the City's Planning Department. For the purpose of the sanitary analysis, a full buildout scenario with high population estimates was assumed for Abbey Ridge to reflect anticipated future development conditions relevant to the design life of the sanitary infrastructure.

9.3 PROPOSED SYSTEM

The development proposed in the Abbey Ridge LAP, combined with the ultimate buildout of the Port Kells industrial area to the east, will result in significant capacity constraints in the BBTS. In order to support future development in the area, capacity constraints will need to be addressed.

Servicing Approaches

Options available to resolve the capacity constraints in the BBTS include:

- Upgrade or twin the BBTS
- Divert Port Kells flows from the BBTS
- Bypass Abbey Ridge flows around constrained sections of the BBTS

As noted earlier, many of the constrained sections in the BBTS are located in rear and side yards within narrow right-of-ways, making it challenging to upgrade or twin the BBTS along its current alignment. Topographical constraints also make it challenging to consider an alternate alignment for the BBTS without significant impacts to existing development. Given its location and the topographical constraints, it is not cost effective to upgrade or twin all of the constrained sections in the BBTS. However, there is an opportunity to address some of the constraints in the western portion of the LAP area (west of 179 Street) by upgrading the BBTS to allow some development in Abbey Ridge to proceed. These upgrades are discussed in further detail below.

The Port Kells industrial area is projected to see a modest increase in development over the next few decades. The Port Kells pump station and forcemain, which have an anticipated 30 to 40 years of design life remaining, can accommodate future development with some upgrades. If wastewater flows from Port Kells were removed from the BBTS, capacity issues in the BBTS would be eliminated.

However, in order to divert Port Kells flows, a new Port Kells pump station and forcemain would need to be constructed, complete with a direct connection to Metro Vancouver's NSI. A new Port Kells pump station and forcemain would cost in the order of $9 million, therefore this is not the most cost effective approach to address capacity issues in the BBTS.

Preferred Option

Given the above discussion, the preferred sanitary servicing strategy for Abbey Ridge focuses on servicing future development in the LAP area and bypassing Abbey Ridge wastewater flows around constrained sections in the BBTS in order to minimize the number of trunk sewer upgrades required.

There are several constraints in the BBTS east of 179 Street; a significant amount of future development in Abbey Ridge is also proposed in areas east of 179 Street. Given the expense and difficulty in upgrading the eastern segments of the BBTS to address constraints, it is recommended that a new local pump station be constructed to service future development east of 179 Street. The pump station would be located on 182A Street near the Golden Ears Connector in order to capture all wastewater flows generated by new development via a gravity sewer network. The pump station would pump flows south along 182A Street and west along 98 Avenue and discharge to a future gravity sewer at 179 Street and 98 Avenue. The gravity sewer would discharge to the BBTS at 179 Street near 99A Avenue. This configuration would allow areas east of 179 Street to develop while bypassing most of the constrained sections in the BBTS.

With the 182A Street pump station in place, the following BBTS upgrades west of 179 Street would still be required to address downstream capacity constraints:

- 101m of 750mm diameter to be upgraded to 900mm diameter in the 17800 block of 100A Avenue
- 70m of 750mm diameter to be upgraded to 900mm diameter at 10267 176 Street

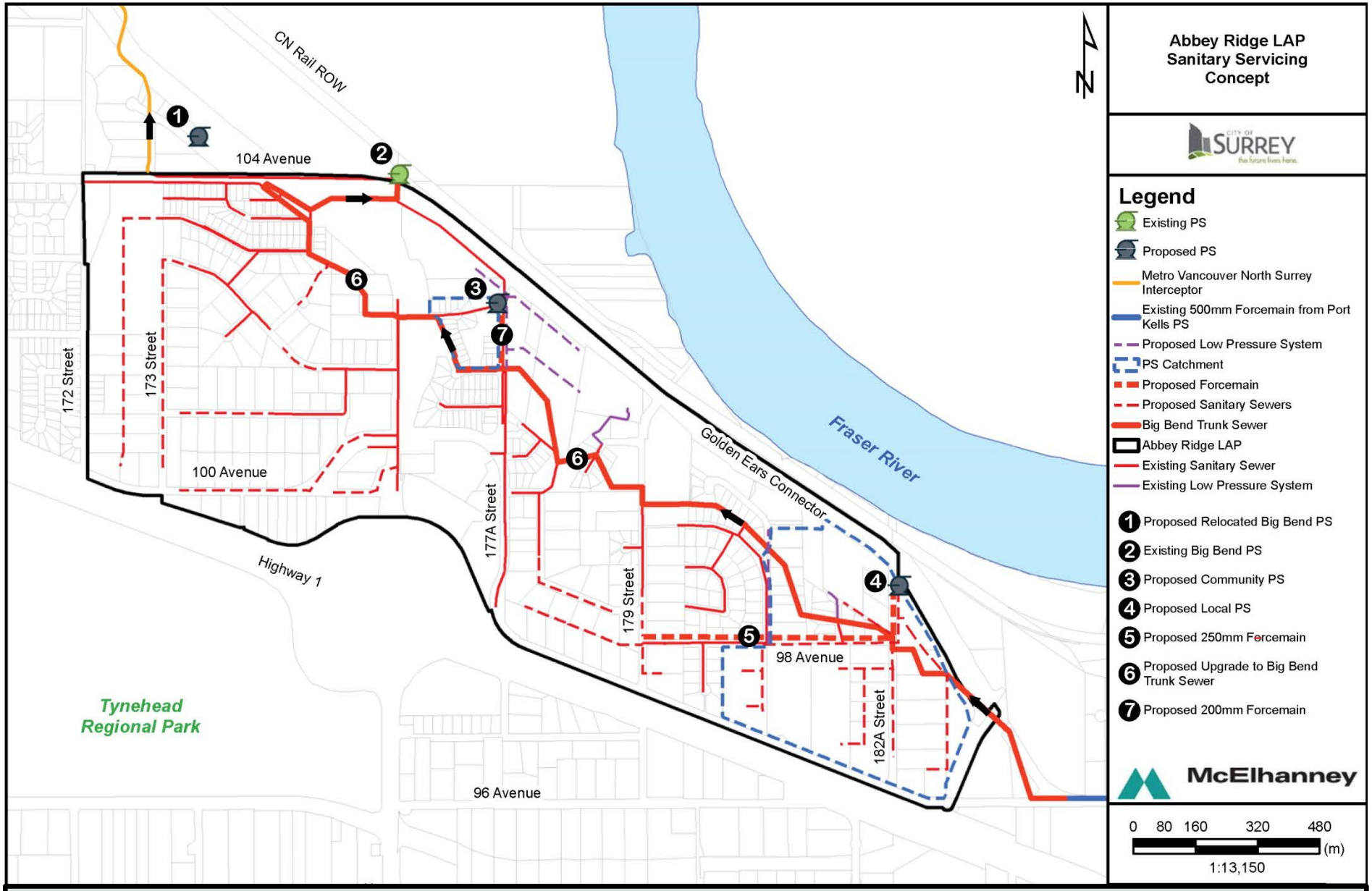
Developments fronting and west of 179 Street can proceed once the two BBTS upgrades noted above are in place. For developments east of 179 Street to proceed, the 182A Street pump station and forcemain should be implemented.

As noted in Section 9.1, the City is currently undertaking the design to relocate the BBPS to a higher elevation. Once the new pump station is in service, the gravity sewer that currently services the existing development on the west side of 177A Street will be abandoned and the catchment will need an alternate method of servicing. To address this issue, the portion of the gravity sewer that services development south of the BBTS will be connected directly to the BBTS. For development north of the BBTS, a small community pump station will be constructed to pump flows south to the BBTS via a short forcemain on 177A Street.

The remaining developable areas south of the BBTS will be serviced by extending the existing gravity sewer network, whereas remaining developable areas north of the BBTS will be serviced by low pressure sewer systems that will pump flows south to the BBTS. Existing developments in Abbey Ridge will continue to be serviced by the same sanitary infrastructure as they are today.

Map 15 illustrates the proposed sanitary infrastructure required to support future development in Abbey Ridge. Map 16 identifies the proposed sewer catchment areas and the servicing approach to be used for each property in the LAP area.

Details on the proposed local and community pump stations, BBTS upgrades, local gravity sewers and low pressure sewers can be found in Appendix A-2.



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Map 15 – Proposed Sanitary Sewer System Servicing Plan

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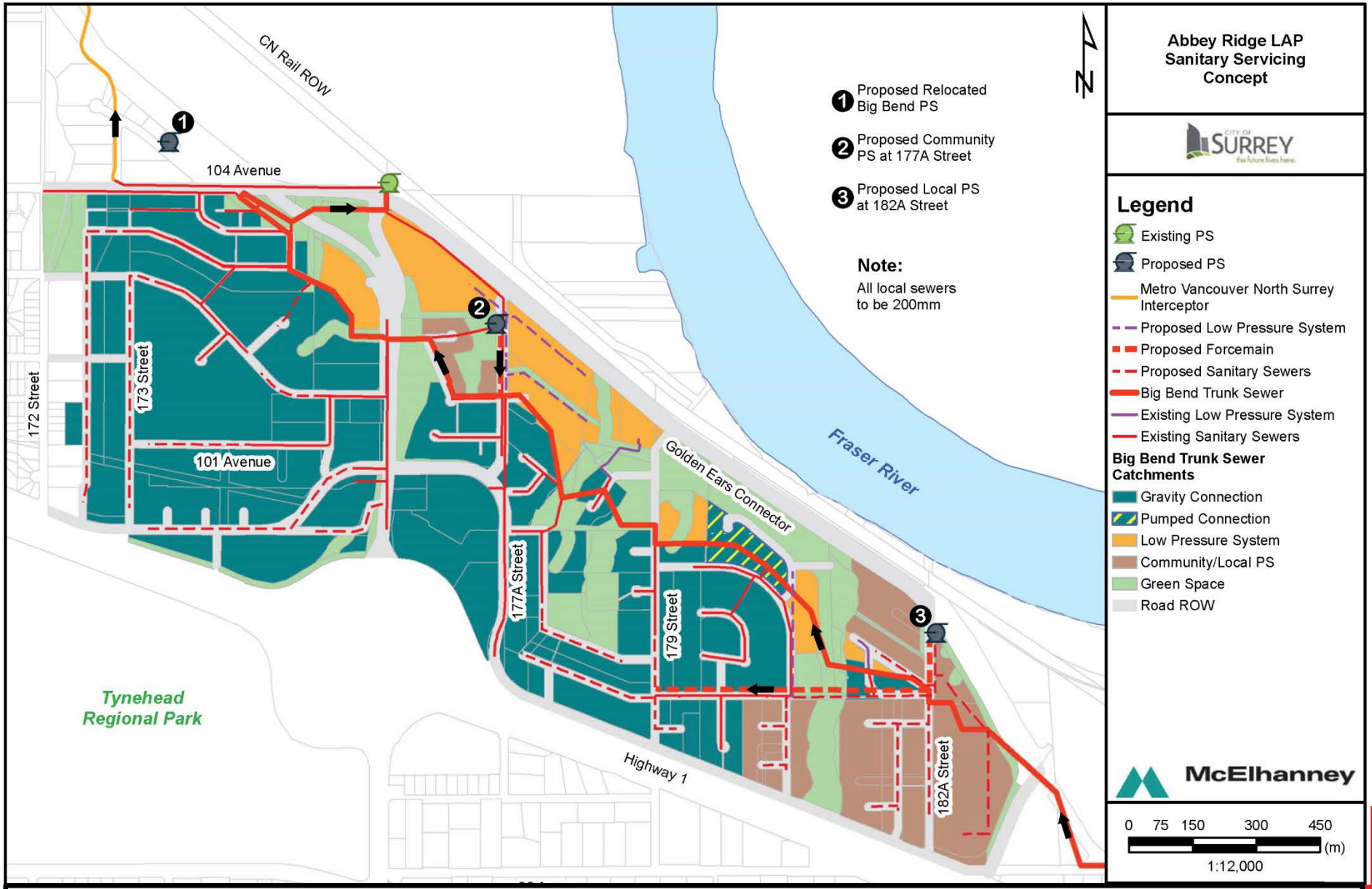


Map 16 - Proposed Catchment Areas and Local Sewer Network

9.3

9.4 COSTS AND FINANCING

Sanitary sewer upgrades identified to service the Abbey Ridge LAP area are summarized in Tables 9 and 10.

Table 9 itemizes major system upgrades required for development in Abbey Ridge; these costs can be attributed to growth.

Table 9 – Sanitary Infrastructure required to service the Abbey Ridge LAP (DCC Eligible)

Location	Length (m)	Size (mm diameter)	**Cost Attributed to Growth (DCC Eligible Costs)**
100A Ave: lot 17833 – lot 17845	101	900	$ 320,000
176 St: lot 10267	70	900	$ 290,000
179 St: north of 98 Ave *(upsize only)*	150	250	$ 15,000
182A St: north of 98 Ave *(upsize only)*	150	250	$ 15,000
182A Street Pump Station and Forcemain			$ 1,700,000
TOTAL (rounded up to nearest $10,000)			**$ 2,340,000**

Notes:

- Costs are as of December 2016
- Costs include engineering (12%), and contingency (15%).Pump Stations include 15% engineering and 30% contingency.
- These cost estimates are based on the City's previous project experience. Actual costs may vary depending on unforeseen project design requirements, construction and economic market conditions, local interest in the project(s) and currency fluctuations.

Further details can be found in Appendix A-2.

Local sewers (gravity and low pressure) will be funded by the fronting developer(s). The community pump station on 177A Street will be funded by the City as a capital work since the pump station is required due to the BBPS relocation, and is not a result of future development in Abbey Ridge.

Table 10 summarizes the non-DCC eligible costs for proposed sanitary infrastructure in Abbey Ridge.

Table 9 - Sanitary Infrastructure required to service the Abbey (Non-DCC Eligible)

Item	Cost Attributed to Growth (Non-DCC Eligible)
Community Pump Station at 177A Street	$ 760,000
Local Gravity Sewers	$ 7,200,000
Low Pressure Sewers	$ 1,840,000
TOTAL	**$ 9,800,000**

Further details on sanitary infrastructure costs are provided in Appendix A-2.

SECTION 10
Water

10
WATER

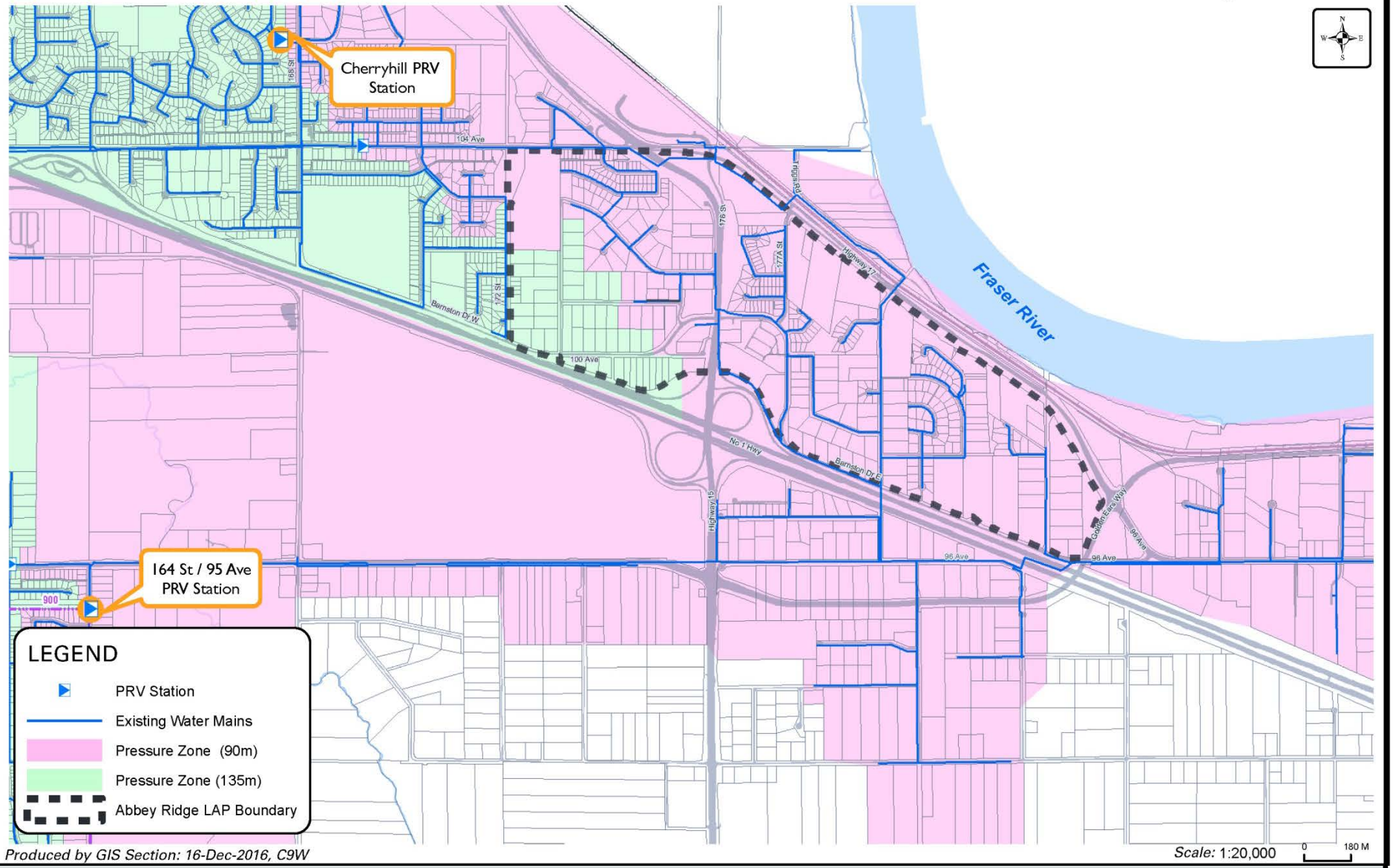
This section describes existing water servicing conditions and identifies the water infrastructure required to service the Abbey Ridge LAP.

10.1 EXISTING WATER SERVICING

Abbey Ridge is located in two water pressure zones, due to the elevation changes in the area. Water in the 90m pressure zone is supplied by a direct connection from Metro Vancouver's transmission main on 164 Street at 95 Avenue. From there, a 525mm feeder main along 96 Avenue delivers the water to areas in the eastern and northern extents of the pressure zone, including Abbey Ridge. The majority of areas within the 90m pressure zone are supplied with City water, with remaining areas serviced by private groundwater wells.

The portion of Abbey Ridge that falls within the 135m pressure zone is not currently serviced by the City's water system. These properties rely on private groundwater wells.

Map 17 summarizes the existing water system in Abbey Ridge. Further details can be found in Appendix A-2.



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Map 17 - Existing Water Servicing

10.2 DESIGN CRITERIA AND ANALYSIS

The City's Design Criteria Manual (2016) was used to establish the standard level of service to be provided for Abbey Ridge. The following relevant parameters were considered:

- Maximum Day Demand is 1,000 L/capita/day
- Peak Hour Demand is 2,000 L/capita/day
- Fire Flow design requirement as per Table 3.1.1 of the Design Criteria Manual
- Minimum Residual Pressure is 14 m (20 psi) during maximum day plus fire flow conditions
- Operating Pressure is 28 m (40 psi) at all nodes during peak hour conditions
- Hydraulic grade in mains larger than 250mm diameter shall not exceed 0.5% or 5 m/km
- The velocity of flow shall not exceed 2 m/s
- Hazen-Williams Coefficient of 125 for all water mains 250mm diameter and larger
- Hazen-Williams Coefficient of 100 for all water mains 200mm diameter and smaller

Employment and residential population estimates were provided by the City's Planning Department. For the purpose of assessing system capacity under future conditions, the full buildout scenario with high population estimates were used.

10.3 PROPOSED SYSTEM

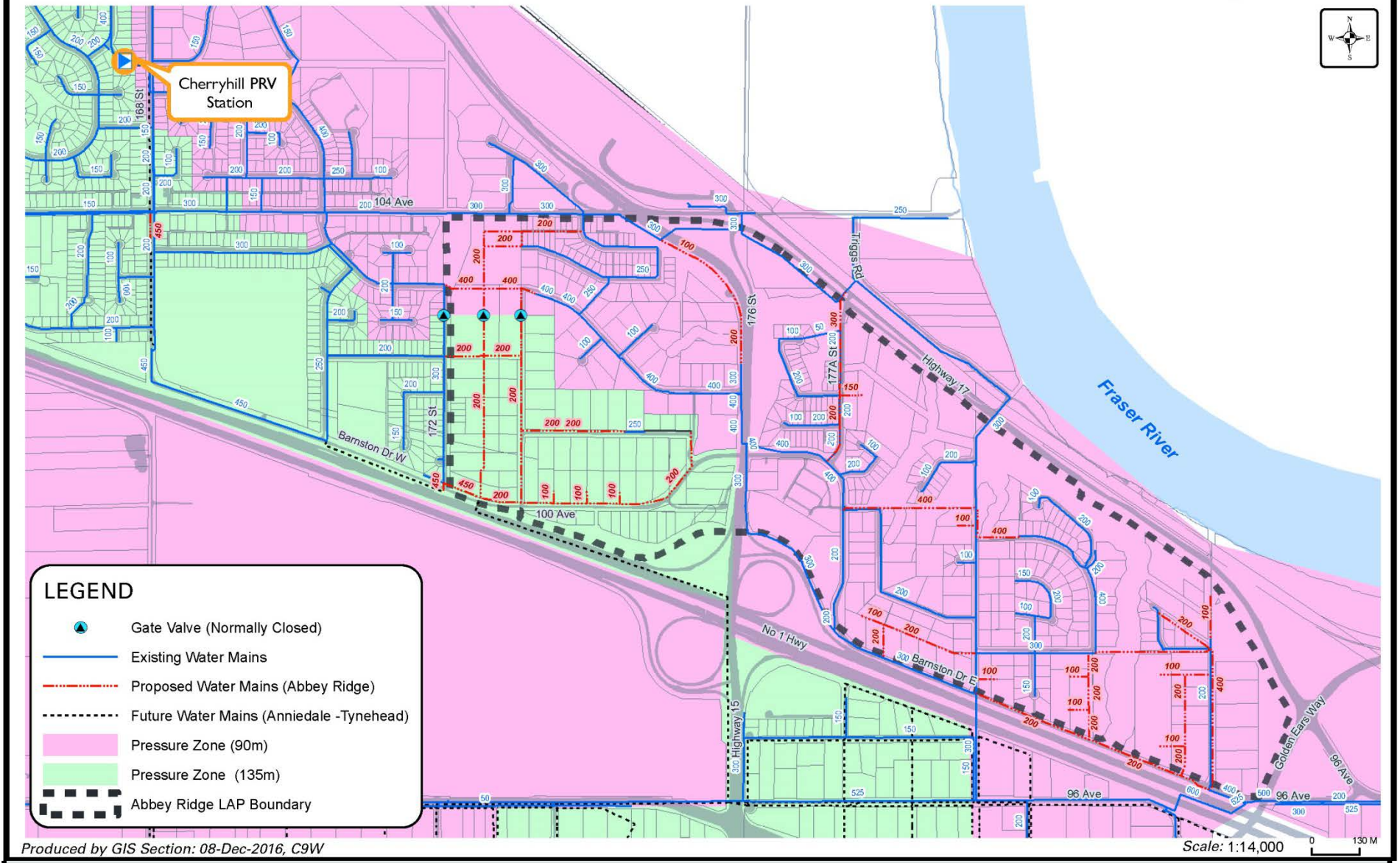
The topography within Abbey Ridge requires that two separate pressure zones be established. The majority of the LAP will be located in the lower 90m pressure zone, while the southwest portion of the LAP will be located in a higher 135m pressure zone, due to higher elevations.

The proposed servicing strategy for the 90m pressure zone in Abbey Ridge is via the existing Cherryhill PRV station. The Cherryhill PRVs will need to be re-set to feed the 90m pressure zone as critical feeds. A flow meter will be required downstream of the Cherryhill PRV station to measure the flow into the 90m pressure zone. The Cherryhill PRV station is fed by the Whalley pump station via a network of feeder mains in the 135m pressure zone. The 90m pressure zone also requires the completion of a 400mm feeder main network to convey flows from the Cherryhill PRV station throughout the LAP area. The 400mm feeder main is partially complete with over 3,000 metres of main installed, but requires an additional 1,600 metres of main to complete the network.

The proposed servicing strategy for the 135m pressure zone in Abbey Ridge is from Whalley pump station via a network of feeder and distribution mains. In order to service this area, water distribution mains must be extended from the existing mains at 172 Street and Barnston Drive West. The infrastructure required to support the Anniedale-Tynehead Neighbourhood Concept Plan (NCP) will provide additional redundancy for the Abbey Ridge water supply, such as the 450mm feeder main on 168 Street and Barnston Drive West. The feeder main will extend through Abbey Ridge and across Highway 1 to feed the 135m pressure zone in Anniedale-Tynehead. The 450mm main is sized for Anniedale-Tynehead, but has the capacity to also supply Abbey Ridge.

To reduce the number of dead-end water mains at the 90m / 135m pressure zone boundary, the existing zone boundary is shifted east for the proposed system. As a result, there are properties currently serviced by City water along 101 Avenue (west of 175A Street) that will be transferred from the 90m pressure zone to the 135m pressure zone.

Map 18 illustrates the proposed water servicing strategy for Abbey Ridge. Further details can be found in Appendix A-2.



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Map 18 – Proposed Water System Servicing Plan

10.4
COSTS AND FINANCING

Water infrastructure upgrades identified to service the Abbey Ridge LAP area are summarized in Table 10.1. These are major system upgrades required for development in Abbey Ridge and the costs can be attributed to growth. The current 10-Year (2016-2025) Servicing Plan includes portions of the 400mm diameter watermain that extends from 172 Street to 182A Street in the 90m pressure zone and the 450mm diameter feeder main that extends along 168 Street and Barnston Drive West in the 135m pressure zone.

There is no new water infrastructure required for Abbey Ridge that is not already included in City's current 10-Year (2016-2025) Servicing Plan.

Table 11 Water Infrastructure required to support the development of the LAP area.

Table 11 - Water Infrastructure required to service the Abbey Ridge LAP (DCC Eligible)

Location	Length (m)	Diameter (mm)	Cost Attributed to Growth (DCC Eligible Costs)
177A: Barnston Dr E - Trigg Rd (Upsizing)	486	300	$ 36,450
103 Ave: 172 - 173 St (Upsizing)	255	400	$ 59,925
100 Ave: 177 - 179 St (Upsizing)	264	400	$ 62,070
100 Ave: 177 - 179 St	100	400	$ 60,000
179 St: 99A - 100 Ave	79	400	$ 47,573
99A Ave: 179 - 180 St (Upsizing)	120	400	$ 28,200
98 Ave: 181 - 182A St (Upsizing)	187	400	$ 43,833
98 Ave: 181 - 182A St (Upsizing)	130	400	$ 78,000
182A St: Barnston Dr E - 98 Ave	392	400	$ 235,487
Cherryhill Dr / 168 St (Flowmeter)	-	-	$ 60,000
168 St: 103A - 104 Ave (Upsizing)	107	450	$ 107,000
		Subtotal	$ 818,538
		Contingency	$ 122,781
		TOTAL (rounded)	**$ 942,000**

Notes:

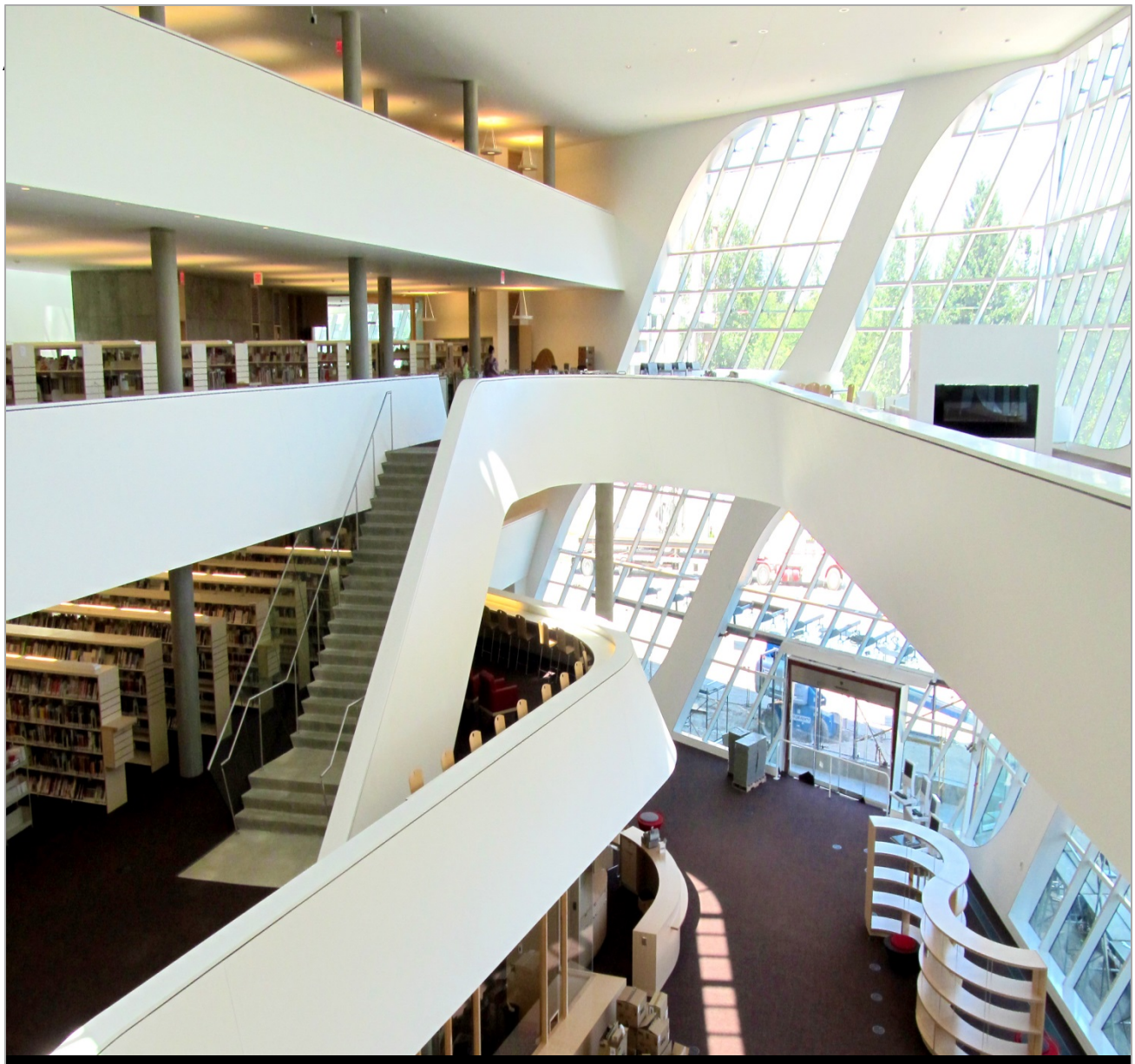
- Costs are as of December 2016
- Costs include engineering (12%), and contingency (15%).
- These cost estimates are based on City's previous project experience. Actual costs may vary depending on unforeseen project design requirements, construction and economic market conditions, local interest in the project(s) and currency fluctuations.

Fronting development costs (to be funded by the development community) for Abbey Ridge are estimated to be $7.0 Million.

PART C

Appendices and Acknowledgements

Photo: Surrey City Hall



APPENDICES

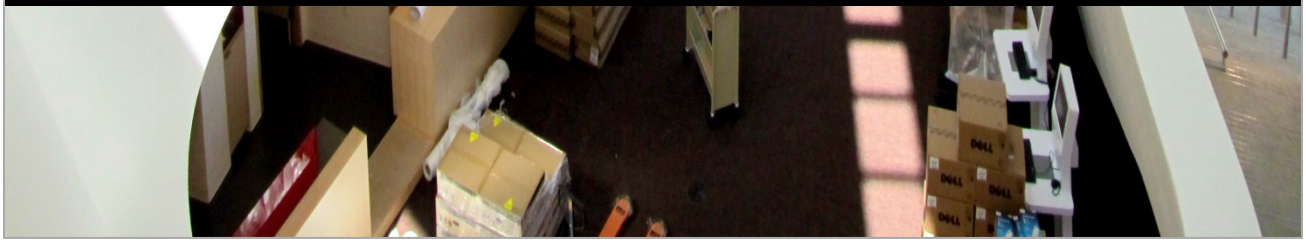


Photo: City Centre Library

A-1
CORPORATE REPORTS

A collection of corporate reports that support the Abbey Ridge Local Area Plan.

List of Reports

Corporate Report No. R048:2015

East Fraser Heights/Abbey Ridge Land Use Concept

Corporate Report No. R243:2015

East Fraser Heights Local Area Plan – Stage 1 Land Use Concept

A-2 CONSULTANT REPORTS

A list of consultant reports that informed the Abbey Ridge Local Area Plan is provided for convenience.

Reference List

A-2.1

Phoenix Environmental Services Ltd. East Fraser Heights Environmental Study: Ken Lambertsen and Associates, 2015

A-2.2

McElhanney Consulting Services Ltd. Abbey Ridge Servicing Reports; 2016 & City of Surrey Servicing Report

A-2.3

R.F. Binnie and Associates Ltd. Road Network Evaluation and Recommendation – Abbey Ridge Local Area Plan (Stage 2) Transportation Servicing Plan;2016.

Appendix A-2.1 - East Fraser Heights Environmental Study

Appendix A-2.2 - Abbey Ridge Servicing Reports

Appendix A-2.3 - Abbey Ridge Transportation Servicing Plan

ACKNOWLEDGEMENTS

The City of Surrey acknowledges the contribution and participation of the following individuals, organizations and staff members in the preparation of this Local Area Plan.

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Consultants

Phoenix Environmental Ltd.

McElhanney Consulting Services Ltd

F.F. Binnie & Associates

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Abbey Ridge
Local Area Plan

Planning and Development &
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APPROVED BY COUNCIL FEBRUARY 2017

CITY OF SURREY