

INFILL AREA PLAN



[FLEETWOOD ENCLAVE]

This Infill Plan provides a framework for development in the Fleetwood Enclave including servicing requirements, transportation designs, parks, trails and amenity contribution rates; and will introduce new requirements at time of development application, along with the provisions for increased neighbourhood service amenities and development potential in the Fleetwood Enclave Neighbourhood.

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SECTION 1: PLANNING AND DEVELOPMENT STRATEGY

Part 1: Background

1.1 CONTEXT

The overall objective of this Infill Area Plan is to provide general policies, a development concept and a financial strategy to guide future urban residential development in Southwest Fleetwood. The Fleetwood Enclave is expected to provide for additional new housing opportunities and is intended to create a liveable, comprehensively planned neighbourhood based on efficient development patterns that cluster housing and provides green space opportunities to preserve significant natural tree canopy areas, and on site rainwater management opportunities. The Infill Area plan will do this by identifying site appropriate land uses, designating the transportation system, and by providing for neighbourhood servicing in an environmentally friendly and staged manner.

1.2 THE PLAN AREA

The Fleetwood Enclave infill area includes approximately 25.7 hectares (63.5 acres) of land, as illustrated in **Figure 1**, with approximately 20.2 hectares (50 acres) of land forming part of the new infill area development concept plan. The entire plan area is bordered by urban single family homes along 78A Avenue to the north, the unopened 76 Avenue Road Right-of-Way to the south along the Agricultural Land Reserve (ALR), Eaglequest Golf Course to the west, and Fleetwood Park to the east.

There are currently 32 individual properties (lots) in this Infill area. The current zoning in the area is predominantly RA One-Acre Residential Zone (20 lots) and A-1 General Agriculture Zone (12 Lots). The current Official Community Plan (OCP) designation in the Infill area is entirely Suburban. 24 newly subdivided (2012) Small suburban lots are located directly adjacent to the ALR boundary, within a Comprehensive Development Zone approved in 2011. The Fleetwood Enclave Area contains primarily large acreage residential homes, and has a rural ambience characterized by, pastures, established mixed species second growth trees and south facing views towards the Serpentine Valley.

The area contains several large 20-35 year old single family homes or hobby farms, and treed areas. Unlike the surrounding Fleetwood area, this small pocket of lands has not experienced urbanization and growth of residential neighbourhoods to the north due mainly to poor road and transportation accessibility, and its location along the Agricultural Land Reserve (ALR). Vehicle access to this neighbourhood is from 80 Avenue to the north, along either 155 Street or 156 Street. No roads continue to the south, east or west do to Parks, ALR, and Golf Course uses. Private lot sizes range from 3,453 m² to a little over 2.6 hectares. Most commonly found lot sizes include 3,453 m² lots and 1.2 hectare lots.



Figure 1 - Aerial Photo of Study Area

1.3 INITIATION OF THE INFILL AREA PLAN

On October 17, 2011, Surrey City Council considered an initial Planning Report from the Planning and Development Department (**See Appendix A**) for a rezoning of a portion of the Southwest Fleetwood Enclave site, located at 7626 – 155 Street and 7628 - 156 Street, and a related Development Permit application, to allow for the development of 24 small suburban single family lots (zoned CD based on the Residential Cluster (RC) Zone, with significant open space and to establish buffering along the ALR boundary.

As part of the development report the applicant's consultant was required to prepare a development concept plan for the remaining Southwest Fleetwood Neighbourhood. Planning Staff and Council noted that further refinement was needed with respect to the distribution of open space and the general road pattern, which should be based on a modified grid with a high degree of internal connectivity and off sight traffic improvements to be determined by a Traffic Study.

The application subsequently proceeded to Public Hearing on November 7, 2011. At the Public Hearing, Council heard concerns from residents regarding the potential impact the proposed development could have on the neighbouring agricultural property to the south, wildlife in the area, and development of lands to the North. As part of the subsequent development approval, Surrey City Council directed City Staff work on creating a local development area concept plan for the larger Fleetwood Enclave Neighbourhood to the North.

Council therefore initiated the Fleetwood Enclave Infill Area Plan to address questions regarding the overall development concept and concerns regarding development impacts on:

- Agricultural lands to the south within the (ALR);
- Ecosystem and Biodiversity function and wildlife movement;
- Parks, Trails and Recreation Opportunities;
- Transportation, Traffic and Pedestrian Network Capacity;
- Land Use Types and Densities;
- Adjacent neighborhood Interface;
- Financing, Services and Amenity Contributions

The hubs and corridors identified within the Ecosystem Management Study were intended to provide overall guidance as to the delineation of open space, which has been reflected in this concept. The refinement of the development concept prepared by the applicant's consultant will involve input from various City Departments as well as public consultation with property owners in and adjacent to this area.

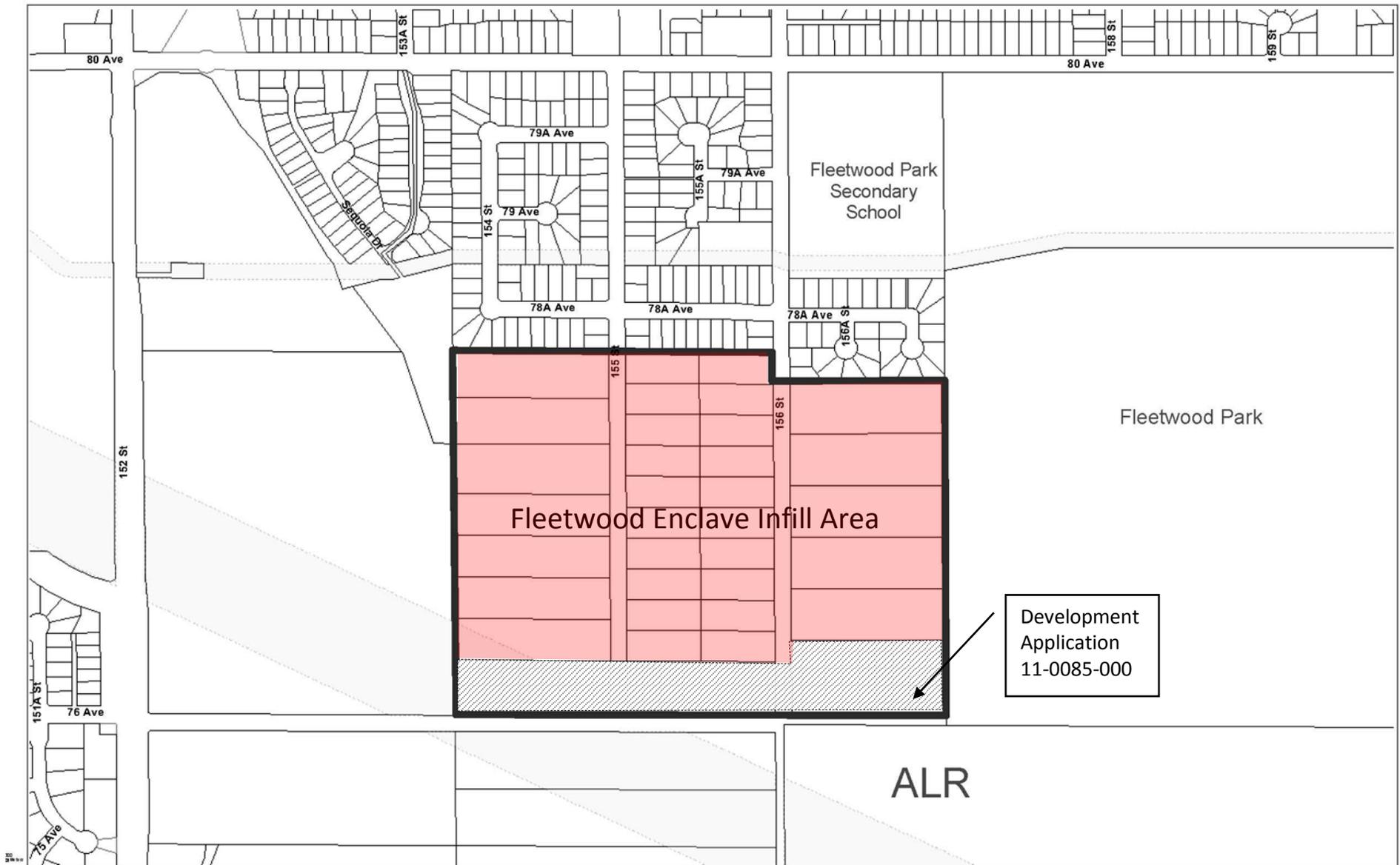


Figure 2 - Fleetwood Enclave Infill Area Boundaries

1.4 POLICY FRAMEWORK

Community Development in Surrey is conducted and administered within a series of plans, policies and by-laws. These include the Metro Vancouver Regional Growth Strategy, Surrey Official Community Plan, and in some specific areas Secondary and Neighbourhood Concept Plans, and/or Infill Area Plans. Finally the Zoning By-law, as well as several other city bylaws and provisional regulations guide land use and development within the City.

Within the hierarchy of these Plans, the Surrey Official Community Plan must conform to the Metro Vancouver Regional Growth Strategy (Urban Growth Boundary) while all the other Plans and By-Laws must conform to the Official Community Plan. Like the Regional Growth Strategy and the Official Community Plan, all other Secondary Land Use Plans, including infill area plans within the hierarchy generally address the physical, environmental, social and economic aspects of the area for which they are prepared.

1.5 OPPORTUNITIES AND CONSTRAINTS

The Fleetwood Enclave Infill Area has multiple opportunities as well as constraints including transportation network and access limitations, distance to local amenities and transit, proximity to the agricultural land reserve, and access to green space.

1.5.1 Transportation Network

The Infill area is bounded by urban single family homes along 78A Avenue to the north, the unopened 76 Avenue Road Right-of-Way to the south along the Agricultural Land Reserve (ALR), Eaglequest Golf Course to the west and Fleetwood Park to the east. There are two existing Local roads entering into the Infill area from the north at 155 Street and 156 Street.

All traffic flowing in or out the plan area must converge at the 156 Street intersection point at 80 Avenue ,as 156 Street ends 100 meters into the ALR ending at the Surrey Lake Trail head, with no east west connections out of the study area, due to the unopened 76 Avenue Road ROW to the south. The current subdivision format is based primarily on access to 155 and 156 streets with alternative access points extending in or out of the Study area. There is, therefore, only one existing access point which limits the range of densities and uses that can be provided. Transportation and traffic issues are discussed in Section 2, Part 5 and in full in **Appendix C** - Transportation Report.

1.5.2 Distance to adjacent Amenities and Transit Services

The Southwest Fleetwood Enclave areas proximity to rapid or regular bust transit and local amenities is limited. Therefore, limited densities and uses are proposed in the area.

1.5.3 Tree Hazards

Tree hazards do exist in the area. There is a potential risk of damage caused by falling trees or branches. Although the stand is predominantly composed of healthy, vigorous

trees, it is approaching an age when decay, breakage and incidence of other pathogens are becoming more common. Also, new forest edges will likely be created during future development. Trees exposed along these edges must adapt to increased exposure to wind.

1.5.4 Topography

As shown in **Figure 2**, Topography in the project area is generally flat to gently sloping (2 to 12% grade). Elevation ranges from 10 meters to 50 meters and slope aspect is southwest to southeast. The slopes present no difficulty for servicing and development other than the need to carefully design to minimize steeper roads, protect intersection sight lines, and manage drainage effectively.

1.5.5 Existing Zoning

Current zoning in the Fleetwood Enclave is RA (One-Acre Residential) and A-1 (General Agriculture); however, a development proposal for 24 lots (rezoning to Comprehensive Development based Cluster Residential) was given final adoption by Council on July 26, 2012 on the south edge of the Infill Area Plan.

1.5.6 Existing Land Use

A BC Hydro right-of-way borders the south end of the Study Area. Most existing use is residential and agricultural. A landscape nursery is located in the agricultural lands on neighbouring property to the south within the Agricultural Land Reserve (ALR).

1.5.7 Surrounding Land Uses

Land uses surrounding the Infill Area are summarized in **Table 1**, and include residential, recreational, and agricultural development. Agriculture land extends south to the Serpentine River and beyond. North and west of the SWFN are urban and suburban residential neighbourhoods. Two of the largest parks in the area (Fleetwood and Surrey Lake) are within 100 meters. These parks offer passive recreation opportunities including hiking, biking and nature appreciation. A golf course exists to the west a portion of which is within the Agricultural Land Reserve.

Table 1 - Surrounding Land Uses

Direction	OCP Designation	Existing Zone	Land Use Type
North	Urban	RF	Urban Residential Lots
East	Suburban	A-1	Fleetwood Park
South	Agricultural	A-1 in ALR	Agricultural Land Reserve
West (South)	Agricultural	CPG partially in ALR	Eaglequest Golf Course
West (North)	Suburban	CD	Strata Residential Subdivision

1.5.8 Environment

Environmental and tree preservation issues are discussed in Section 2.4 and in full in **Appendix B.:** Environmental Report.

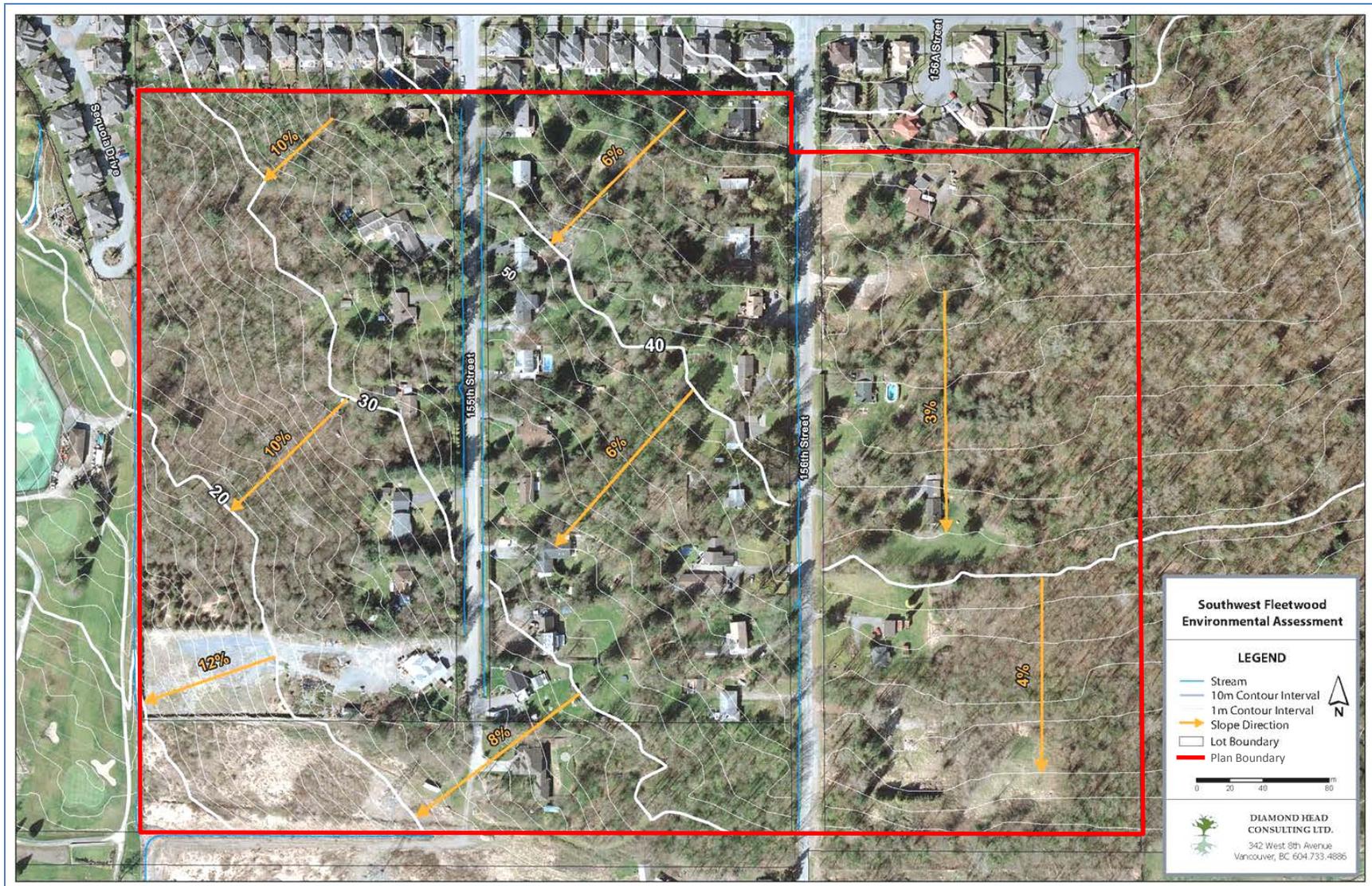


Figure 3 - Topography

1.5.9 Servicing

Servicing issues are discussed in full in Section 2: Engineering & Servicing Strategy

1.5.10 Land Consolidation

Land consolidation areas have been identified in to advise future developers of consolidation requirements and to ensure feasible development areas which achieve an equitable distribution of road and open space dedication, land development, and construction costs. Consolidation Policies and are discussed in Section 2.8.

1.6 THE PLANNING PROCESS

1.6.1 Owners Meeting Consultation

Throughout the process, many landowners and their consultants met with the City individually and in groups to be apprised of the planning process and to be given an opportunity to discuss and resolve issues as they arose. In addition, a formal Land Owners meeting was held early on in the Planning process.

April 30, 2012 Land Owners Meeting

The formal land owners meeting was held prior to the first public open house at Fleetwood Park Secondary School. The presentation and display materials reviewed the Fleetwood Enclave boundaries, introduced the City's planning team, reviewed the key environmental study findings, discussed key opportunities and challenges, and presented how the planning process will take place.

Time was allotted to allow initial comments and suggestions about development in the area to provide input into the preparation of the Fleetwood Enclave plan and proposals for the future of the area. The overall Land Owners reaction was positive with some concern regarding density ranges and green space allocation. Approximately Twenty Five (25) Land Owner attended the meeting with a total of six (6) comment Sheets received by the City.

1.6.2 Public Meeting Consultation

There were two formal presentations to the Public made. One was held on May 15th, 2012 and the other on January 23rd, 2013 at Fleetwood Park Secondary School.

May 15, 2012 Open House

All property owners in the Infill area, as well as land owners north and south of plan area up to 80 Ave were directly notified by mail, with a Newspaper add advertising the Public Open House published in the Surrey Leader. Approximately 88 people attended the meeting. In addition to a sign-in sheet, an exit questionnaire was provided to obtain comments on issues to be addressed through the Infill area process. 21 Comment

sheets were received by the Planning and Development Department. City of Surrey Staff made a short presentation which was followed by a question and answer period.

These open house sessions attended by City of Surrey staff from Planning and Development, Parks and Recreation, Land Development, and Transportation Divisions. The overall Land Owners reaction was positive to the initiation of the plan.

January 23rd, 2013 Open House

All property owners in the Infill area, as well as land owners north and south of plan area up to 80 Ave were directly notified by mail, with a newspaper ad advertising the Public Open House published in the Surrey Leader. A notification email was also sent to all residents, land owners or interested parties who wished to be contacted after the first Public open house. Approximately 80 people attended the meeting. In addition to a sign-in sheet, an exit questionnaire was provided to obtain comments on issues to be addressed through the Infill area process.

1.6.3 Interagency Referrals

1.6.3.1 Surrey School Board

The estimated maximum 224 Single Family dwellings at time of build out of the Fleetwood Enclave are estimated to have the following impact on the following schools:

Projected number of Students for this Infill Area:

Elementary Students:	114
Secondary Students:	57

September 2011 Enrolment/School Capacity

Coyote Creek Elementary	
Enrolment (K/1-7):	73 K + 487
Capacity (K/1-7):	40 K + 600
Fleetwood Park Secondary	
Enrolment (8-12):	1345
Nominal Capacity (8-12):	1200
Functional Capacity*(8-12):	1296

The following tables (2 and 3) illustrate the enrolment projections (with current/approved ministry capacity) for the elementary and secondary schools serving the Fleetwood Enclave Infill area.

Fleetwood Park Secondary



Table 2 - Fleetwood Park Enrolment Projections

Coyote Creek Elementary

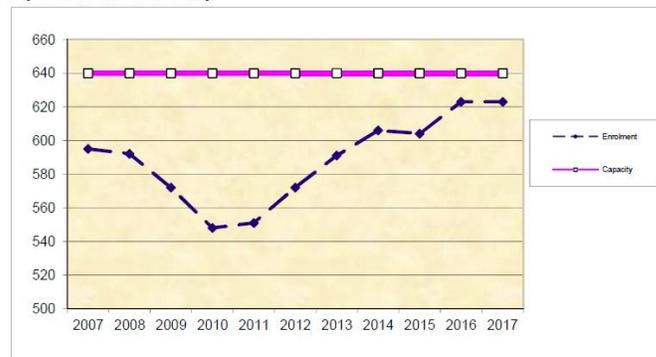


Table 3 - Coyote Creek Elementary Enrolment Projections

Capacity for Coyote Creek Elementary includes the main school building (40K + 500) plus a modular classroom complex with capacity of 100. There are no new capital projects proposed at the elementary school and no new capital projects identified for the secondary school.

The estimated number of new students has been adjusted higher for single family units with secondary suites. Depending upon actual student yield from dwellings with secondary suites, the projected enrolment shown in the tables above may be slightly higher.

Due to an aging demographic in the existing urban areas surrounding Fleetwood Park and Coyote Creek School catchment area, enrolment is not expected to exceed functional capacity of the schools in this area due to increased enrolment from Fleetwood Enclave students.

1.6.3.2 City Advisory Committees

Agriculture and Food Security Committee (AFSAC)

On September 13, 2012 a presentation was provided to the City of Surrey Agriculture and Food Security Advisory Committee (AFSAC). Considerations were noted to ensure development permit area compliance and input from the committee regarding future development applications within 300 meters of the ALR boundary.

Environmental Advisory Committee (EAC)

On October 24, 2012 a presentation was made to the Environmental Advisory Committee. Committee commented that the Fleetwood Enclave plan has some of the most consideration for the environmental values of similar plans in the City, and were generally supportive of the concept plan.

1.6.3 Land Owner and Local Neighbourhood Concerns

The Infill area plan was refined in further discussions between City staff and landowners directly. A number of landowners and residents outside the infill area provided written comments, and emails received during the course of the preparation of this plan. All comments and concerns have been discussed at different times by City Staff and Landowners, and where possible changes have been made to the Infill Area Plan.

In many cases however, it has not been possible to amend or plan, particularly in regards to concerns and reservations about the location and manner of compensation for rights-of-way for roads, trails, or servicing corridors within individual properties.

Part 2: Objectives, Land Uses and Policies

2.1 PLANNING VISION

The neighbourhood will consist of more traditional urban residential buildings with landscaped open spaces containing a variety of vegetation, pathways and street trees. Residential pockets will be united by commonly shared open space and pathways connecting the existing city and park greenway network, and an established east west habitat corridor within a city greenway. Single detached housing will be front loaded and provided on medium sized lots, varying in character by block. Tree lined roads and buffers will help maintain a human scale to development.

The general road pattern is based on a modified grid with a high degree of connectivity within the plan, within a pocket of contained future urban lands. When combined, these components will provide a sense of cohesion, quality, and an overall feeling of community in the Fleetwood enclave. The lower density limits of Southwest Fleetwood will be about the quality of built form, appropriate scale of housing, and a high quality welcoming public realm.

2.2 SPECIFIC OBJECTIVES

A series of specific objectives, listed below, were developed with input from an interdepartmental City Staff team, local community members, and city advisory bodies.

Community

The focus is on a well-planned, pedestrian friendly, identifiable community that responds to the site and natural surroundings. The plan will provide a framework for delivering a high quality, comprehensively planned residential community.

Housing

Housing shall be designed for private detached homes for single families with ample front, side and rear yards. This will cater to a families, empty nesters, and seniors. Density of single family dwelling will remain low (4 - 5UPA) in the area, to transition away from the Agricultural Lands to the south. Overall densities diminish from 5 UPA and 4 UPA to 2 UPA densities to the south.

Safety

The detailed design of the community will incorporate principles of Crime Prevention through Environmental Design (CPTED). Housing will face the Green Open space along Fleetwood Park and Golf Course to encourage passive surveillance of open space areas.

Parks

The community will be served by a variety of existing parks outside the plan area including Surrey Lake and Fleetwood that provide for a mix of active and passive uses including habitat preservation. The neighbourhood will be linked to the overall park and trail system through a series of multiuse pathways and an east west wildlife corridor. Additional open space and natural area will be added to Fleetwood Park to buffer impacts on this area from

Urban Development and provide additional passive green space areas to enhance the park. Future pedestrian and greenway links into Fleetwood Park may be provided through these open space corridors.

Urban Design

Urban design principles will contribute to make the community attractive and liveable through design, provision of buffers and parks, landscaping, maintenance of views to the Serpentine Valley, and design guidelines for residential development. Residential development will face the green areas of the plan allowing for open and long term public enjoyment of these features.

Movement

The plan will provide an inter-connected circulation system that supports the land use patterns and urban design concept by providing safe optional routes for vehicles, bicycles, and pedestrians.

Services

The plan will foster an economical servicing system as a logical staged extension of existing systems to support the land use concept and minimize the environmental impact on receiving streams and the lowlands.

Transitions

There will be appropriate land use transitions and landscape treatments between adjacent uses, both within the land uses in the Infill area and between the Infill area land uses and surrounding uses such as urban areas to the north and parklands to the east and west. Environment Best practices, tree preservation, mitigation measures, and design will be used to minimize any environmental impacts on the hydrologic regime associated with redevelopment and provide for the integration of key woodlands into the neighbourhood.

To address the agricultural interface, a 17-metre (56 ft.) wide portion of land was dedicated to the City as Parkland along the 76 Avenue right-of-way, which is adjacent the ALR boundary and the neighbouring agricultural uses.

Implementation

The neighbourhood redevelopment will be implemented through a series of rezonings and subdivisions that match development and market demand. Plan changes and approvals will provide for community input and the interplay of market forces.

Financing

The Infill area will be primarily self-funded by the landowner/ developers through standard Development Cost Charges (DCCs), and amenity contribution fees. Front-enders of trunk services will recover costs.

2.3 PLANNING PRINCIPLES

A set of planning principles have been designed to guide development in the Southwest Fleetwood Enclave to promote and ensure development activities that yield improved quality of life, environmental sensitivity, and sense of community. These Planning

Principles have been grouped in six theme areas and will guide development within Southwest Fleetwood Enclave as described in the table below.

Table 4 – Fleetwood Enclave Planning Principles

THEME AREA	PLANNING PRINCIPLES
<p>2.3.1 Parks, Open Space, Recreation and Natural Areas</p>	<p>I. Retain significant environmental features, important vegetation and Ecosystem Hubs, Sites and Corridors:</p> <ul style="list-style-type: none"> a) Consider Open “Green” Space locations which incorporate protection of significant and/or valuable ecosystems; b) Minimize clear cutting vegetation and clearing lands during development were feasible and encourage the soil retention, and replanting of native trees; c) Encourage cluster development and open space contributions with specific site designs that respond to the area’s natural features. d) Establish an effective east-west habitat corridor connection. e) On east and west edges of plan have development ‘Face the Green’ along single loaded green streets. <p>II. Provide improved access to Community Park Amenities including Fleetwood Park, Surrey Lake Park, and Surrey Lake Greenway:</p> <ul style="list-style-type: none"> a) Provide trail/Multi-use Pathway connection into Fleetwood Park; b) Establish passive park nodes at the end of each side of the east-west habitat corridor; c) Provide a natural area pathway within the East-West habitat corridor, connecting to Surrey lake Greenway.
<p>2.3.2 Roads, Transportation, Pedestrian and Bicycle Circulation</p>	<p>III. Create opportunities for pedestrians and bicycle movement linked with adjacent community amenities.</p> <p>IV. Design local roads that provide for efficient internal movement of people while sustaining the quality and character of the neighbourhood.</p>
<p>2.3.3 Infrastructure and Servicing</p>	<p>V. Ensure the cost-efficient and adequate provisions for City services including sewer, drainage, water, roads and utilities without placing a financial hardship upon the City’s resources.</p> <p>VI. Ensure practices in the design of the drainage system, and the protection of water quality and resources.</p>

<p>2.3.4 Sense of Place and Identity</p>	<p>VII. Protect and maintain the natural beauty and distinctive natural heritage of the area by:</p> <ul style="list-style-type: none"> a) protecting view corridors, high arboriculture values and individual significant trees; b) enhancing view opportunities along the south facing slope in and out of the ALR.
<p>2.3.5 Residential Housing and Density</p>	<p>VIII. Protect the character and quality of life in existing and established residential areas during development:</p> <ul style="list-style-type: none"> a) avoid piecemeal re-development; b) provide guidelines and implementation policies such as phasing plans, landscape buffers, parcel consolidation plans, and minimum redevelopment parcel sizes. <p>IX. Designate densities that make serving feasible while also respecting environmentally sensitive and agricultural (ALR) edge transition areas.</p> <p>X. Locate cluster residential development with considerable open space components adjacent to Fleetwood Park, and other high ecosystem value;</p>
<p>2.3.6 Agricultural Edge Transition</p>	<p>XI. Recognize, protect and enhance the Agricultural Land Reserve (ALR) Boundary and its interface by reducing density near ALR and clustering development and density away from the ALR edge.</p> <p>XII. Ensure the establishment and long term maintenance of effective buffers (fences, planted landscaping, open spaces, natural vegetation), between residential development areas and the ALR.</p>

2.4 PLANNING CONSIDERATIONS

2.4.1 Place making and Identity

Place making includes creating a liveable residential community which has an identifiable character, sense of place, and provides for a high quality of life. Some public realm and design features will include a ‘green’ single-loaded local road right-of-way allowing for the natural area to enhance the community and provide an identifiable landscape that “faces the green” along the east and west borders of the plan area.

A garage set-back from building face will be required that provides clearly identifiable entrances and front porches to allow for social activities between homeowners and passers-by from the community. In addition, high quality design features, building materials and a strong orientation to the street is encouraged.

2.4.2 Green Infrastructure Network Opportunities

The Fleetwood Enclave area is strategically important as an ecosystem connector. Three potential corridors were identified in the Surrey Ecosystem Management Study (EMS) to act as physical or functional linkages between terrestrial hubs; all were ranked in terms of their ecological significance.

The east corridor connecting the Fleetwood Enclave to Fleetwood Park was ranked highest of the three. A southern corridor to Surrey Lake was next highest, followed by the third corridor that could potentially connect to Bear Creek/Enver Creek Parks to the northwest. The east Fleetwood corridor has significant natural forest cover and is the least fragmented of the three.

The southern corridor has a wide BC Hydro right-of-way separating the Infill Area and Surrey Lake. Vegetation management is required to protect overhead lines; therefore, no forest cover can be established in this zone (approximately 120 m). The proposed northwest corridor is the longest by far (>1 km) and is not be considered a priority. Much of the landscape has been modified; currently, a golf course and residential neighbourhoods predominate with relatively few trees to the west.

The draft City of Surrey Biodiversity Strategy also includes an East West Green Infrastructure 'Local Corridor Connection' from Fleetwood Park.

2.4.3 Tree Retention

Trees have numerous social, environmental and economic benefits which contribute to improved quality of life. Managing for these multiple values while taking advantage of the free ecosystem services provided by trees can significantly reduce costs related to infrastructure, maintenance and human health. Generally, larger trees have a proportionately higher value than small trees.

See Figure 4 – High Arboriculture Value Plan

On an individual basis, conifers provide the most benefits and are the highest value trees in the Fleetwood Enclave. Large Douglas-fir in the dominant canopy layer are the most valuable, followed by the large Black Cottonwood and Western Red cedar. Red Alder and Big leaf Maple provide relatively fewer economic values; however, they are important tree species in early serial stages of forest development. Both species add large amounts of organic material and fix nutrients, helping to amend the soil to support the establishment of climax coniferous species. Red Alder is particularly important due to its nitrogen fixing abilities.



Figure 4 - High Arboriculture Values

Future development in the Fleetwood Enclave should attempt to preserve higher value habitat within open 'green space' area where practical, and individual significant trees on individual lots. Focus should be on supporting priority components of the green infrastructure network and maintaining the ecological integrity of existing hubs specifically along the edges of the plan on Eastern edge of plan adjacent to Fleetwood Park and along western edge of the plan along the golf course lands.

See **Figure 5 – Naturalness Values of Fleetwood Enclave**

Maintaining buffer habitat that is connected to Fleetwood Park and enhances connectivity to Surrey Lake Park is highest priority for this area, with the highest level of naturalness and best allocated to reduce edge effects for biodiversity of the park. Individual Significant trees and select wind firm Conifers should also be retained wherever possible trees within open green space areas and Landscape buffers should be protected during development, and vegetation cover should be enhanced with planting as determined by the Surrey Parks, Recreation and Culture department with limited passive recreational trail access in key locations.



Figure 5 - Fleetwood Enclave Naturalness Values

2.4.4 Riparian Area Management

Riparian areas in the Fleetwood Enclave Area are not associated with any significant aquatic values. All classified watercourses in the neighbourhood are ditches (Class C). Three of these ditches are associated with roads. The fourth borders the golf course on the western edge of the study area. These ditches supply water and nutrients for part of the year to downstream watercourses; however, they do not support fish or a great diversity of benthic invertebrates. Seepage areas are present on the east and west sides of the area; they contain several small, shallow pools; however, the pools are unlikely to persist year round. **See Figure 6 – Streams and Watersheds.**

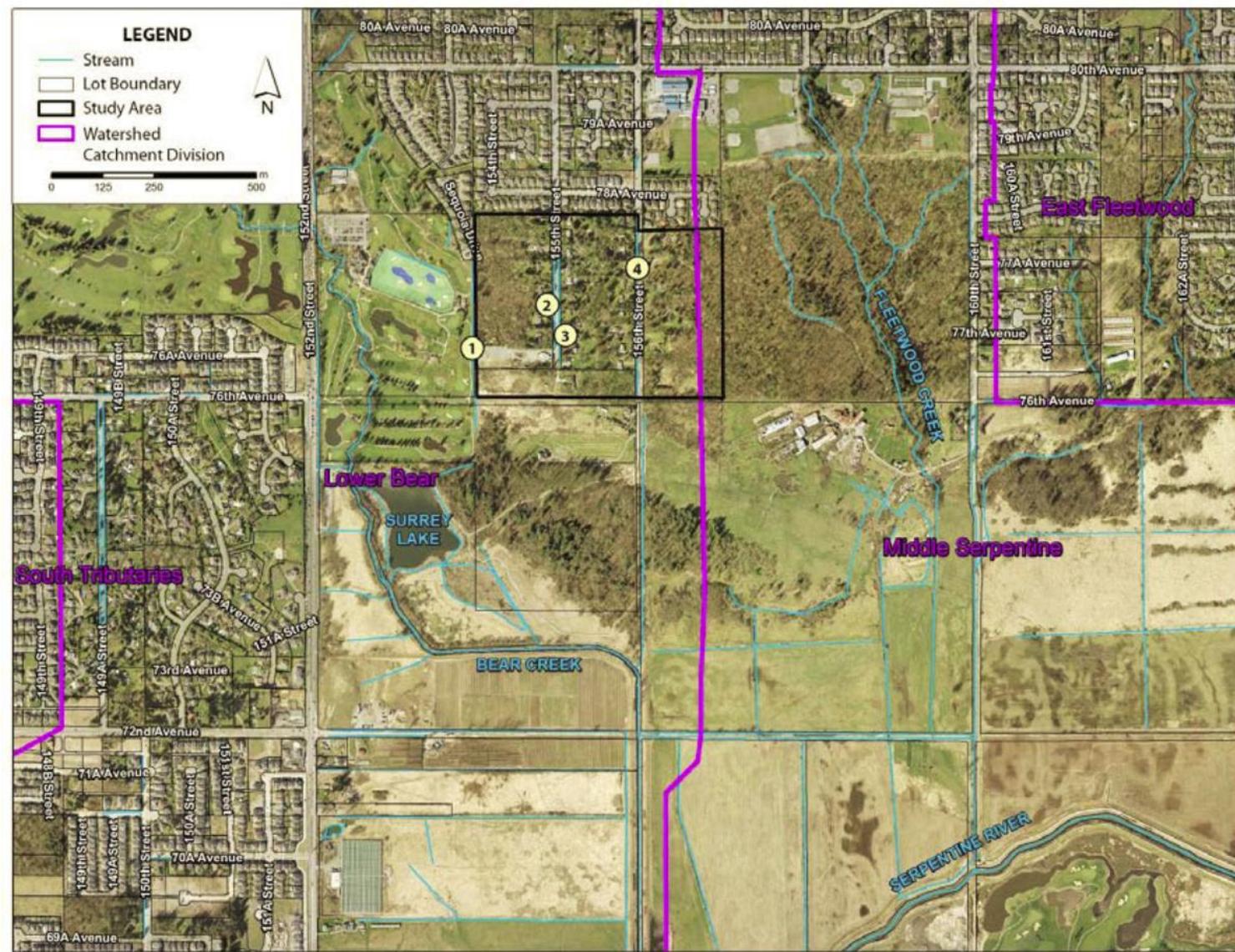


Figure 6 - Streams and Watersheds

2.4.5 Interface with Agricultural Areas

To address the agricultural interface, a 17-metre (56 ft.) wide portion of land was dedicated along the 76 Avenue right-of-way, which is adjacent, the ALR boundary and the neighbouring agricultural operations as part of a pre-existing approved development application. This land will separate the residential uses from the adjacent ALR. Parks, Recreation and Culture will maintain this portion of the park as a natural area. The developer will be required to provide any improvements to the parkland to augment the existing vegetation, to establish a maintenance fund, and to erect a black, chain-link fence along the southern property line of the residential properties as per the Surrey Agricultural and Food Security Advisory Committee (AFSAC) recommendation.

In addition, it was recommended by the AFSAC on September 12, 2012 that:

- Signage be provided as part of future development to indicate that you are entering ALR Lands along 156 Street south of unopened 76 Avenue ROW;
- As part of future development include Farm Practices Awareness:
 - Register a Covenant on property titles within 300 m of the ALR to inform potential home purchaser that farm operations are in the area and that farm practices such as noise, odour and dust should be expected during certain times of the year as part of acceptable farm practices.
 - Include a Subdivision Agreement as part of development approval
Example: *“The developer agrees to advise the purchaser, and future tenants, that noise, dust and odour associated with nearby farm operations may occasionally affect some activities of dwelling occupants”.*
 - Residential building construction to include triple-paned windows within 300 m of the ALR.
- Public access, even by a pathway, is non-farm use and must be approved by the Agricultural Land Commission (ALC).

2.4.6 Interface with Existing Urban Neighbourhood

In order to limit disturbance between existing Urban Neighbourhoods to the North, a minimum level of landscaping or tree preservation is required in each private lot along all rear yards shall be determined from the Minimum Landscape Buffer Treatment width proposed in the land use plan (**Figure 7**) and interface cross section for landscape Buffers described in 2.6.5.3 Transition C: Adjacent to Existing Urban Area Fronting 78 Ave. Landscape buffers area will form part of a Restrictive Covenant held on each lot.

All construction on-site must occur concurrently with erosion control measures to prevent the pollution, degradation, or siltation of natural areas and water courses. This includes the provision of temporary fencing prior to and during construction. Where the retention of native trees and ground cover is required or permitted, a letter from a registered professional landscape architect or registered professional forester shall be submitted, indicating the mitigation measures required during and after the construction to ensure the health of the vegetation to the satisfaction of the City.

2.4.7 Cluster Housing and Green “Open Space” Areas

Cluster housing guidelines apply to the “Low Density Cluster 4 UPA” designation and “Low-Medium Density 5 UPA” areas within the Infill Plan. “Green Space Transfer” areas refer to the areas of a site where preservation of open space occurs. The potential density from the green space transfer area is intended to be transferred to the “development area” of a site.

Portions of the Green Space Transfer areas may be “community space” and may be used for future 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 Engineering and Parks, Recreation and Parks Department.

If open space transfer areas are not allocated in a manner consistent with these Infill Area guidelines, density maximums will not consider lot area averaging in all Cluster Residential areas, and densities will not include undevelopable portions of the lot such as Road right-of-ways, and Utility Easement areas, densities should not be calculated on the Gross area, and should not exceed 2 Units Per Acre (UPA) within 200 meters of the ALR and 4 Units Per Acre within 400 meters of the ALR.

Developments should apply for a specific comprehensive development zone with a base zone containing density dimensional and building form standards most closely comparable to the total approved net density of the cluster development. Maximum density based on the entire lot shall not exceed 7 units per net acre.

The boundaries of designated green open space areas, recreation areas, rainwater management facilities, and natural areas shall be clearly delineated on plans, including subdivision plans, rezoning plans.

2.5 “INFILL AREA” LAND USE PLAN

2.5.1 Overview of Land Use Concept Plan

The intent of the Infill Area Land Use Concept Plan is to focus primarily on new residential development and green space preservation. The proposed land use concept is shown on **Figure 7: Infill Area Land Use Concept Plan**.

A central feature of the neighbourhood is the east-west connecting boulevard and central wildlife corridor between the divided 77 Avenue Local Roadway. Single detached housing on larger lots will pre-dominate the area. On the east side of the plan area, there will be a minimum 25 meter treed open space adjacent to Fleetwood Park along with Residential lots fronting onto the Open “Green” Space along a single loaded fronting road. The western portion of the plan contains a similar cluster housing density and form, with a treed open space landscape buffer adjacent to the gold course. The Central Spine of the Plan contains rows of single family homes facing 155 St, future 155A St, and 156 Street.

The structure in the western sector builds upon the existing road layout and provides a road over the existing sewer interceptor line in the southwest corner. In the eastern sector, a new local collector system is introduced in the middle of the lot to allow frontage lots. In both areas, the land use concept illustrates a network of potential local roads. A system of walkway/trail connections links the residential areas with parks, surrounding areas, and existing urban neighbourhood.

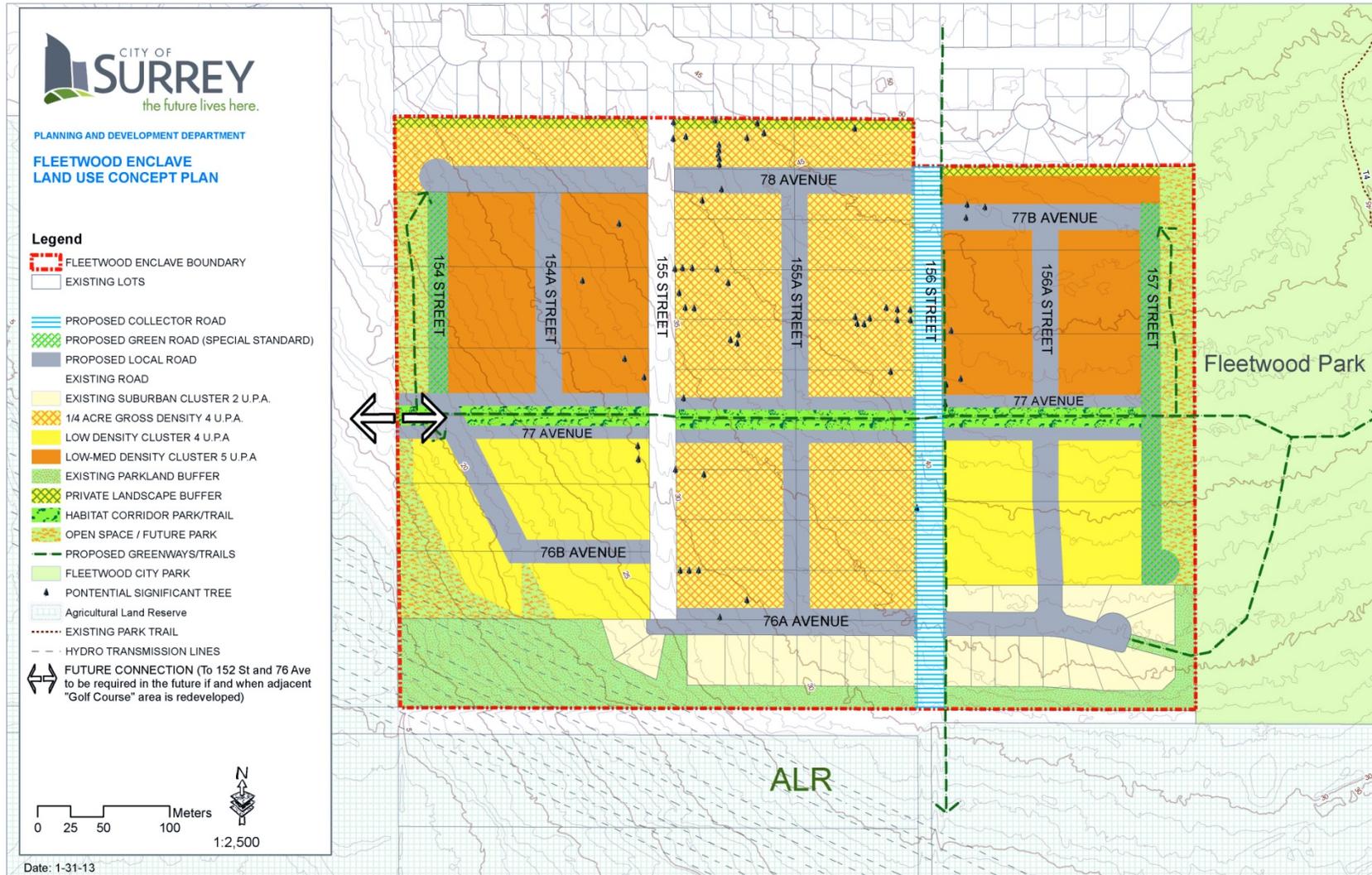


Figure 7 - Infill Area Land Use Concept Plan

2.5.2 General Residential Designation Policies

- The plan provides for traditional single family forms of housing on medium size urban lot sizes in the Infill Area and opportunities for semi-detached (duplex) lots on corners.
- Residential uses are located in a manner that ensures appropriate transitions between uses, both internally in the neighbourhood and externally to adjacent uses.
- Tree preservation for both clumps of high value trees and individual significant trees will be considered as part of Arborist reports and individual lot layouts.
- Variations in setbacks and lot sizes to accommodate tree preservation opportunities will be considered on site by site bases.

The **Table 5** below provides a Summary of the Residential Land Use Designations identified in **Figure 7**. Detailed development guidelines are provided in **Parts 2.5.2.1-2.5.2.3**.

Table 5 - Summary of Residential Land Use Designations

Residential Designation	Density Maximum	Open Space %	General Description	CD Base Zone
 *Suburban Cluster (Zoning Approved in 2011)	2 UPA	50% Open Space Dedication	Single family oriented development clustered away from the ALR, Parkland and Hydro Corridor edge. Lot area averaging using gross density and significant open space component with lot sizes no less than 700 sq m (7,500 sq ft). Minimum lot width of 18 meters.	Residential Cluster (RC) Zone
 Low Density Urban Cluster	4 UPA	13% Open Space Dedication as Passive Park	Primarily single family development, characterized by individual homes constructed in cluster subdivisions away from Fleetwood Park, Habitat Corridor and Golf course lands with lot sizes no less than 465 sq m (5,000 sq ft). Minimum lot width of 15 meters and Minimum lot depth of 30 meters.	Residential Cluster (RC) Zone or RF-G
 ¼ Acre Gross Density	4 UPA	8.5% Parkland Dedication for Habitat Corridor in 77 Ave Blvd	Primarily single family development, characterized by individual homes constructed with lot areas no less than 557 sq m (6,000 sq ft). Minimum lot width of 16 meters and minimum lot depth of 40 meters. Parkland dedication used toward Habitat Corridor Component of Plan. Duplex units on wider lots are permitted at street corners.	Residential Half-Acre Gross Density (RH-G)
 Low-Medium Density Urban Cluster	5 UPA	13 % Open Space Dedication as Passive Park	Primarily single family development, characterized by individual homes constructed in cluster subdivisions with lot areas no less than 371 sq m (4,000 sq ft). Minimum lot width of 13.4 meters for front loaded internal lots. Parkland dedication used toward Open Space Component of Plan. Duplex units may be considered on wider lots at designated street corners.	Residential Cluster (RC) Zone or RF-G

* Approved under Development 7911-0085--00

2.5.2.1 2UPA Suburban Cluster Residential

The 2 UPA Suburban Cluster Residential land use designation is intended to support a suburban life-style and provides a transition between agricultural land uses and more intensive urban land use. This designation is characterized by a range of larger sized lots with significant 50% open space and buffer allocation.

Table 6- Suburban Cluster (2 UPA) Guidelines

2 UPA Suburban Cluster Guidelines	Guidelines
Uses	<ul style="list-style-type: none"> • Single detached, with accessory secondary suite and home based business permitted as per zoning bylaw.
Density	<ul style="list-style-type: none"> • 2 UPA (Gross Density) • FAR 0.45 and maximum allowable floor area 360 sq. m (3,875 sq. ft)
Minimum Open Space to Achieve Gross Density	<ul style="list-style-type: none"> • 46.5% of gross site area(s), with additional <i>Compensation determined by Parks, Recreation and Culture</i>
Principal Building Setbacks	<ul style="list-style-type: none"> • Front: 7.5 m (25 ft) • Rear: 7.5 m (25 ft) • Side: 1.8 m (6 ft) • Flanking Side: 3.6 m (12 ft)
Landscape Buffer(s)	<ul style="list-style-type: none"> • a minimum 17-metre (56 ft.) wide portion of land be dedicated to the City as Parkland along the unopened 76 Avenue right-of-way.
Special Regulations	<ul style="list-style-type: none"> • Standard Secondary Suite Restrictions apply. • No driveway shall be permitted from 156 Street • Register a Restrictive Covenant on title of lots adjacent to ALR to advise of Farming practices in area.
Lot Area Averaging (Subdivision Minimums)	<ul style="list-style-type: none"> • Lot Area: 700 sq.m. (7,500 sq.ft.) • Lot Width: 18 m (60 ft.) • Lot Depth: 30 m (100 ft.)

2.5.2.2 4 UPA Low Density Urban Cluster Residential Lands

The 4-5 UPA Urban Cluster Residential designation is intended to support a urban residential life-style and provides a transition between more intensive urban and agricultural land uses. This designation is characterized by a range of large urban lots with a significant 13% open space allocation.

Table 7 - Cluster Residential (4 UPA) Guidelines

4 UPA Low Density Cluster Guidelines	Guidelines
Uses	<ul style="list-style-type: none"> • Single detached, with accessory secondary suite and home based business permitted as per zoning bylaw, with the potential of duplex buildings on corner lot where feasible.
Density	<ul style="list-style-type: none"> • 4 UPA Gross Density (Cluster) • FAR 0.45 and maximum allowable floor area 325 sq. m (3,500 sq. ft)
Parkland Dedication	<ul style="list-style-type: none"> • Open 'Green Space' areas
Minimum Open Space to Achieve Gross Density	<ul style="list-style-type: none"> • 13% of gross development site • <i>(Compensation to be determined by Parks for Habitat Corridor)</i>
Habitat Corridor	<ul style="list-style-type: none"> • 15 m (50 ft) dedicated Habitat Corridor Connection <i>(Can form portion of Minimum Open Space % to Achieve Gross Density)</i>
Principal Building Setbacks	<ul style="list-style-type: none"> • Front: 7.5 m (25 ft) • Rear: 7.5 m (25 ft) • Side: 1.8 m (6 ft) • Flanking Side: 3.6 m (12 ft)
Special Regulations	<ul style="list-style-type: none"> • Standard Secondary Suite Restrictions • Register a Restrictive Covenant on title of lots adjacent to ALR to advise of Farming practices in area.
Lot Area Averaging (Subdivision Minimums)	<ul style="list-style-type: none"> • Lot Area: 465 sq. m. (5000 sq. ft.) • Lot Width: 15 m (49 ft.) • Lot Depth: 30 m (100 ft.)



2.5.2.3 4 UPA ¼ Acre Residential Gross Density Lands

The 4 UPA ¼ Acre Residential Gross Density designation is intended to support a urban residential life-style and provides a transition between more intensive urban lots to the north and suburban land use adjacent to the ALR to the south. This designation is characterized by large urban lots with 8.5% Parkland Dedication for Habitat Corridor Areas or cash in lieu allocation.

Table 8 - 1/4 Acre Residential Gross Density (4UPA) Guidelines

4UPA ¼ Acre Gross Density Guidelines	Guidelines
Uses	<ul style="list-style-type: none"> Single detached, with accessory secondary suite and home based business permitted as per zoning bylaw, with the potential of duplex buildings on corner lots where indicated on land use plan.
Density	<ul style="list-style-type: none"> 4 UPA Gross Density FAR 0.45 and maximum allowable floor area 360 sq. m (3,875 sq. ft)
Parkland Dedication	<ul style="list-style-type: none"> 8.5% of gross site area for wildlife corridor areas with cash in lieu <i>Compensation for lot dedication shortfall to be determined by Parks</i>)
Open Space Allocation	<ul style="list-style-type: none"> N/A
Habitat Corridor	<ul style="list-style-type: none"> 15 m (50ft) dedicated Habitat Corridor Connection <i>(Can form portion of Parkland Dedication)</i>
Principal Building Setbacks	<ul style="list-style-type: none"> Front: 7.5 m (25 ft) Rear: 7.5 m (25 ft) Side: 1.8 m (6 ft) Flanking Side: 3.6 m (12 ft)
Special Regulations	<ul style="list-style-type: none"> Standard Secondary Suite Restrictions
Lot Area Averaging (Subdivision Minimums)	<p>Single Family</p> <ul style="list-style-type: none"> Lot Area: 557 sq. m. (6000 sq. ft.) Lot Width: 16 m (52.5 ft.) Lot Depth: 40 m (131.2 ft.) <p>Semi-Detached</p> <ul style="list-style-type: none"> Lot Area: 743 sq. m. (8000 sq. ft.) Lot Width: 19 m (62.3 ft.) Lot Depth: 30 m (131.2 ft.)



2.5.2.4 5 UPA Low-Medium Density Urban Cluster Residential Lands

The 5 UPA Low-Medium Urban Cluster Residential designation is intended to support a urban residential life-style and provides a transition between more intensive urban and agricultural land uses. This designation is characterized by a range of urban lots with a significant 13% open space allocation on site.

Table 9 - Low-Medium Cluster Residential (5 UPA) Guidelines

5 UPA Low-Medium Density Cluster Guidelines	Guidelines
Uses	<ul style="list-style-type: none"> • Single detached front loaded lots, with accessory secondary suite and home based business permitted as per zoning bylaw, with the potential of duplex buildings on large corner lot where feasible.
Density	<ul style="list-style-type: none"> • 5 UPA Gross Density (Cluster) • FAR 0.45 and maximum allowable floor area 325 sq. m (3,500 sq. ft)
Parkland Dedication	<ul style="list-style-type: none"> • Open 'Green Space' areas
Minimum Open Space to Achieve Gross Density	<ul style="list-style-type: none"> • 13% of gross site area <i>Compensation for shortfall to be determined by Parks for Habitat Corridor</i>
Habitat Corridor	<ul style="list-style-type: none"> • 15 m (50 ft) dedicated Habitat Corridor Connection <i>(Can form portion of Minimum Open Space % to Achieve Gross Density)</i>
Principal Building Setbacks	<ul style="list-style-type: none"> • Front: 6.0 m (20 ft) • Rear: 7.5 m (25 ft) • Side: 1.2 m (4 ft) • Flanking Side: 2.4 m (8 ft)
Special Regulations	<ul style="list-style-type: none"> • Standard Secondary Suite Restrictions
Lot Area Averaging (Subdivision Minimums)	<p>Single Family</p> <ul style="list-style-type: none"> • Lot Area: 465 sq. m. (5000 sq. ft.) • Lot Width: 13.4 m (49 ft.) • Lot Depth: 30 m (100 ft.) <p>Semi-Detached</p> <ul style="list-style-type: none"> • Lot Area: 743 sq. m. (7000 sq. ft.) • Lot Width: 19 m (62.3 ft.) • Lot Depth: 30 m (131.2 ft.)

2.6.5 Land Use Transitions

There will be appropriate land use transitions and treatments between adjacent uses, both within the Infill Area and with the outside surrounding uses such as agricultural, parks and existing urban areas to the north. Transitions and locations of specific cross-sections are noted on **Figure 5 Transition Area Cross Sections** as described in **Parts 2.6.5.1-2.6.5.7**.

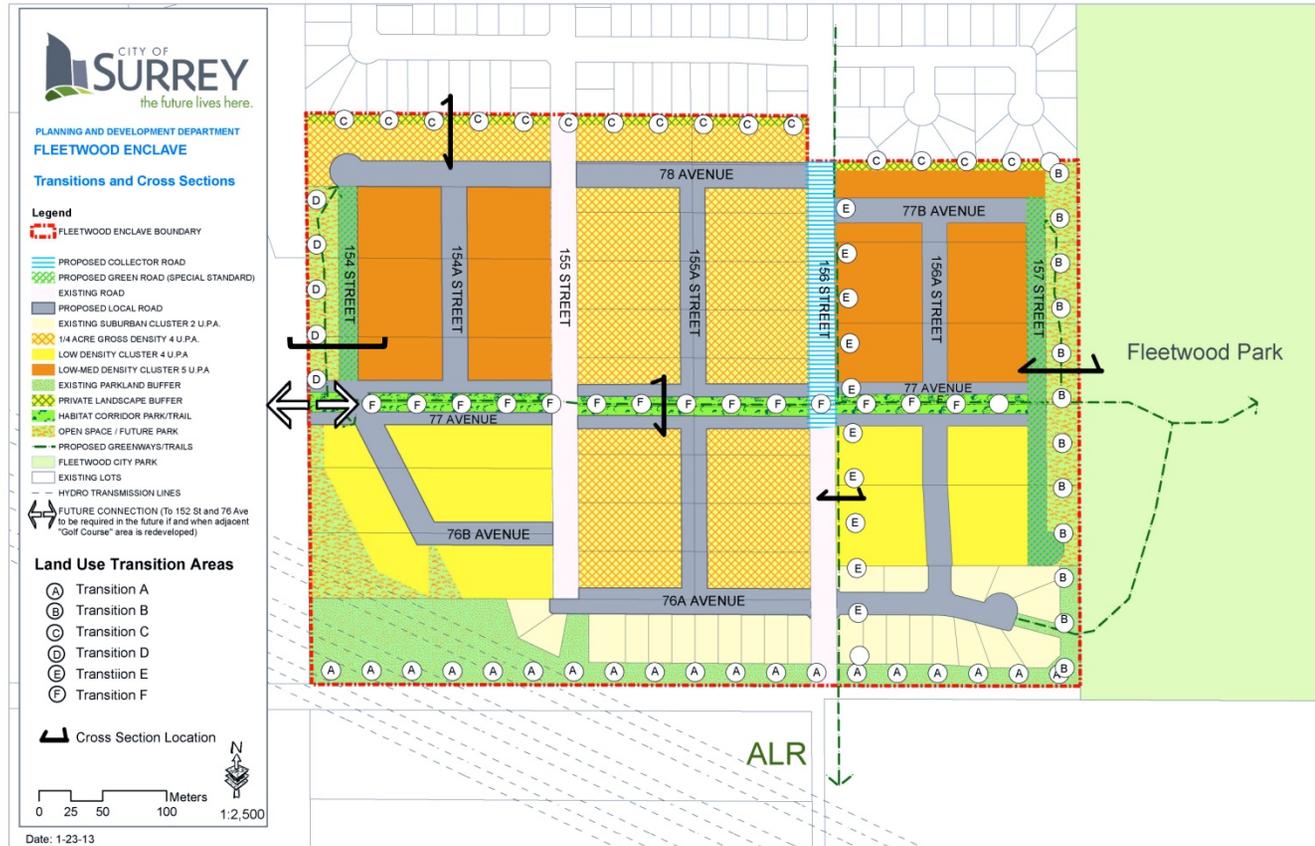


Figure 8 - Transition Area Cross-Sections

2.6.5.1 Transition A: Adjacent to the Agricultural Land Reserve

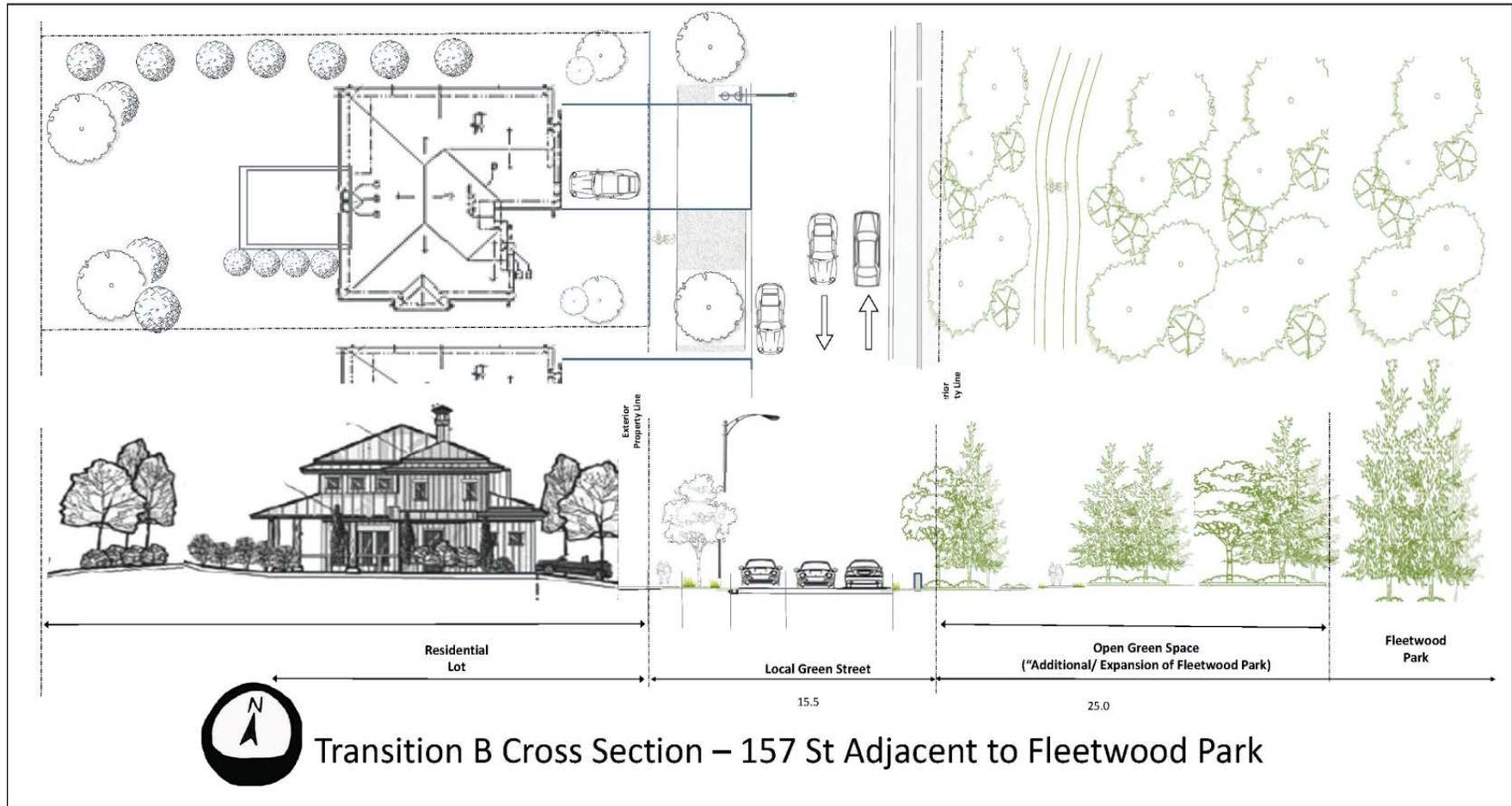
To address the agricultural interface, a 17-metre (56 ft.) wide portion of dedicated parkland is provided along the 76 Avenue right-of-way, which is adjacent to the ALR boundary. This land will separate the residential uses from the adjacent ALR, as required by *Policy No. O-23 "Residential Buffering Adjacent to the ALR/Agricultural Boundary"*. Parks, Recreation and Culture will maintain this portion of the park as a natural area. The applicant has been required to provide any improvements to the parkland to augment the existing vegetation, to establish a maintenance fund, and to erect a black, chain-link fence along the southern property line of the residential properties.

2.6.5.2 Transition B: Adjacent to Fleetwood Park

The transition between the Fleetwood Park area and residential will encourage clustering housing away from the edge to preserve green space and an open, integrated public interface which will 'face the green' and Fleetwood park, while respecting the transition between public and private realms.

A small 15.5 meter local road right-of-way (Green Street) is proposed 25 meters west of the Park Edge (The buffer area) with no parking or sidewalk along the eastern edge of the roadway. Natural areas pathway will be established by Parks within Fleetwood Park adjacent to 157 St. Low, open fencing and landscaping will be consistent with the City's CPTED principles and tree planting will be provided on both sides of the road. Future public access to natural area trails within Fleetwood Park should be carefully managed to avoid impacts to sensitive habitat. A formal park access will be completed by the City from the intersection of 77 Ave and 157 Street. Specific architectural guidelines for the single family lots will be developed during the rezoning process, that will specify low, open but continuous fencing, reduced front yard setbacks to a minimum 3.5 meters, and an encouragement for balconies overlooking parks. Finished floor elevations will be established 0.6 to 0.8 m above the park elevation where possible. The architectural guidelines will be implemented in the form of a building scheme enforced by covenant registered on title.

See **Cross Section 1 – Transition B Adjacent to Fleetwood Park Drawing** for details.



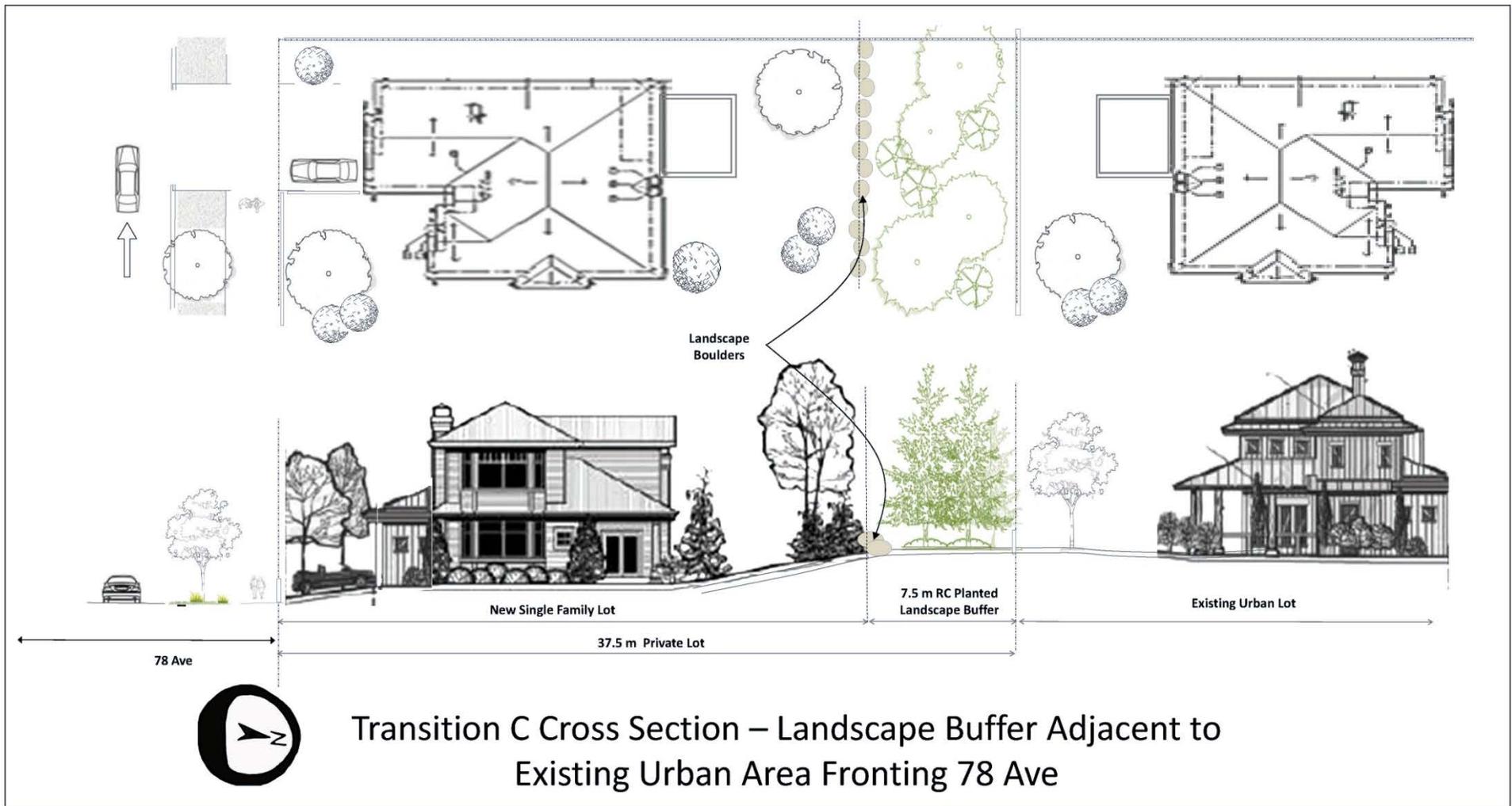
Cross Section 1 - Transition B Adjacent to Fleetwood Park

2.6.5.3 *Transition C: Adjacent to Existing Urban Area Fronting 78 and 78 B Ave*

Single detached housing fronting on 78 and 78 B Avenue will also be developed as a transition to the residential development to the north. The Registered Building Scheme for these lots will require additional year yard landscaping and a Restrictive Covenant Landscape Buffer registered on the rear 7.5 meter or 15 meters for lots fronting 78B Ave of the lot to soften the transition and include a treed rear yard.

Landscaped buffers will be required to be installed prior to the issuance of building permits related to new residential subdivisions and developments. Landscaping will include trees, including coniferous trees, as well as native vegetation, within the required landscaped buffer. Wherever possible, double rows of trees should be planted; with any existing mature trees within the buffer area is to be preserved. A majority of the plant material selected should include low maintenance, indigenous vegetation and should be able to survive with little or no fertilizers. A decorative rock wall or large stone boulders will be installed in front of the Landscape buffer to delineate the edge of the backyard.

See **Cross Section 2 – Transition C Landscape Buffer Adjacent to Existing Urban Area Fronting 78 and 78 B Ave Drawing** for details.



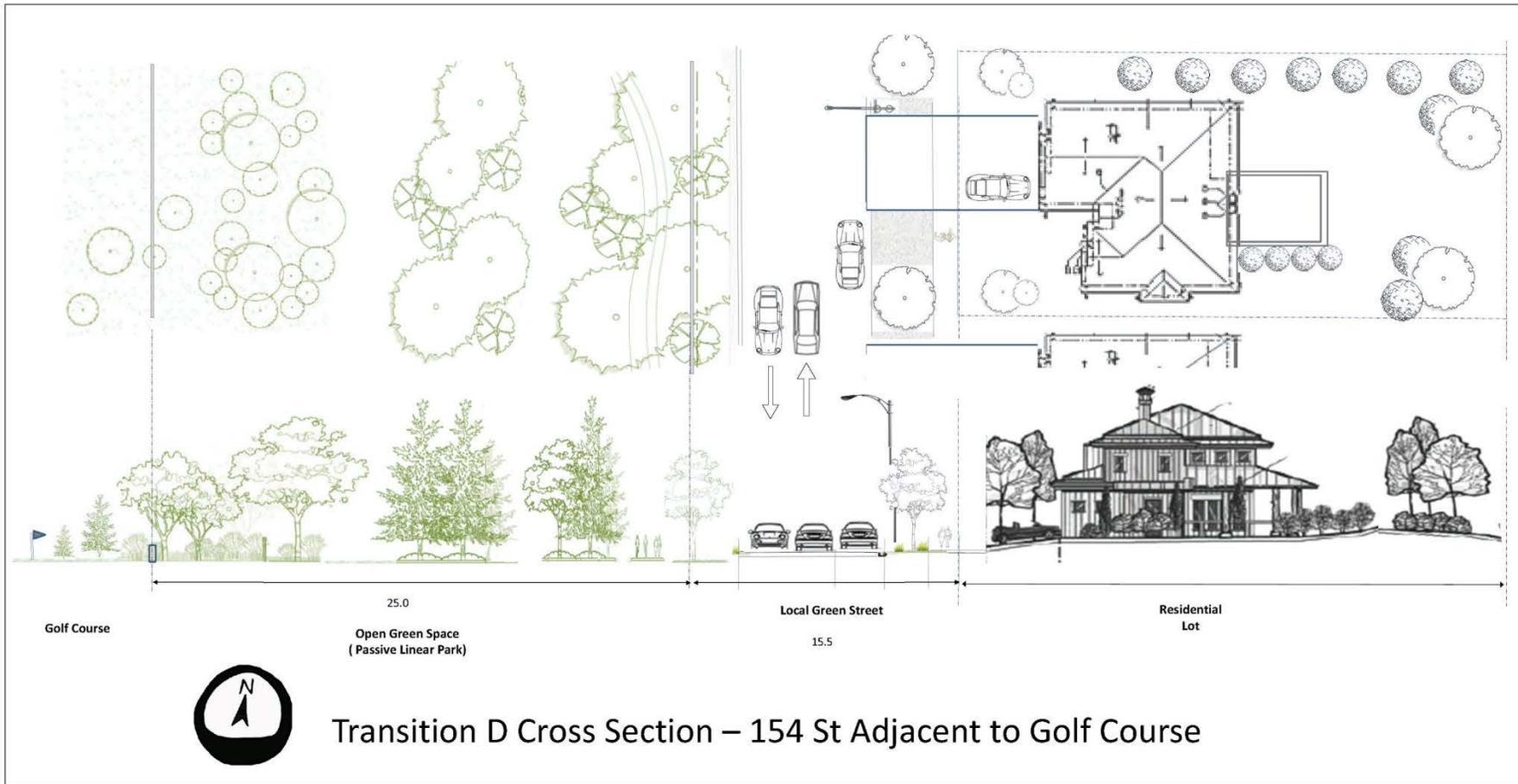
Cross Section 2 – Transition C- Landscape Buffer Adjacent to Existing Urban Area

2.6.5.3 Transition D: Adjacent to Golf Course

The transition between the Golf Course and residential will encourage clustering housing away from the edge to preserve green space and an open, integrated public interface which faces the green space, while respecting the transition between the two private realms.

A small 15.5 meter wide local road right-of-way “Neo Traditional Green Street” is proposed 25 meters east of the North Western Boundary of the Fleetwood Enclave with no parking or sidewalk along the western edge of the roadway. Low, open fencing and landscaping will be consistent with the City’s CPTED principles and tree planting will be provided on both sides of the road. Future public access to nature trail pathway along the western side of 154 St within the greenway should be carefully managed to avoid impacts to sensitive habitat. Specific architectural guidelines for the single family lots will be developed during the rezoning process, that will specify low, open but continuous fencing, reduced front yard setbacks, and an encouragement for balconies overlooking Golf Course. Finished floor elevations will be established 0.6 to 0.8 m above the Golf Course elevation where possible. The architectural guidelines will be implemented in the form of a building scheme enforced by covenant registered on title.

Along the South Western Boundary of the plan housing will back onto open space buffer area near the ALR Edge. Minimum Depth of the buffer area is 7.5 m and provides a continuous greenway belt along nearly the entire western edge of the plan. Housing will front the angled 154 St. **See Cross Section 3 Transition D – Adjacent to Golf Course Lands.**

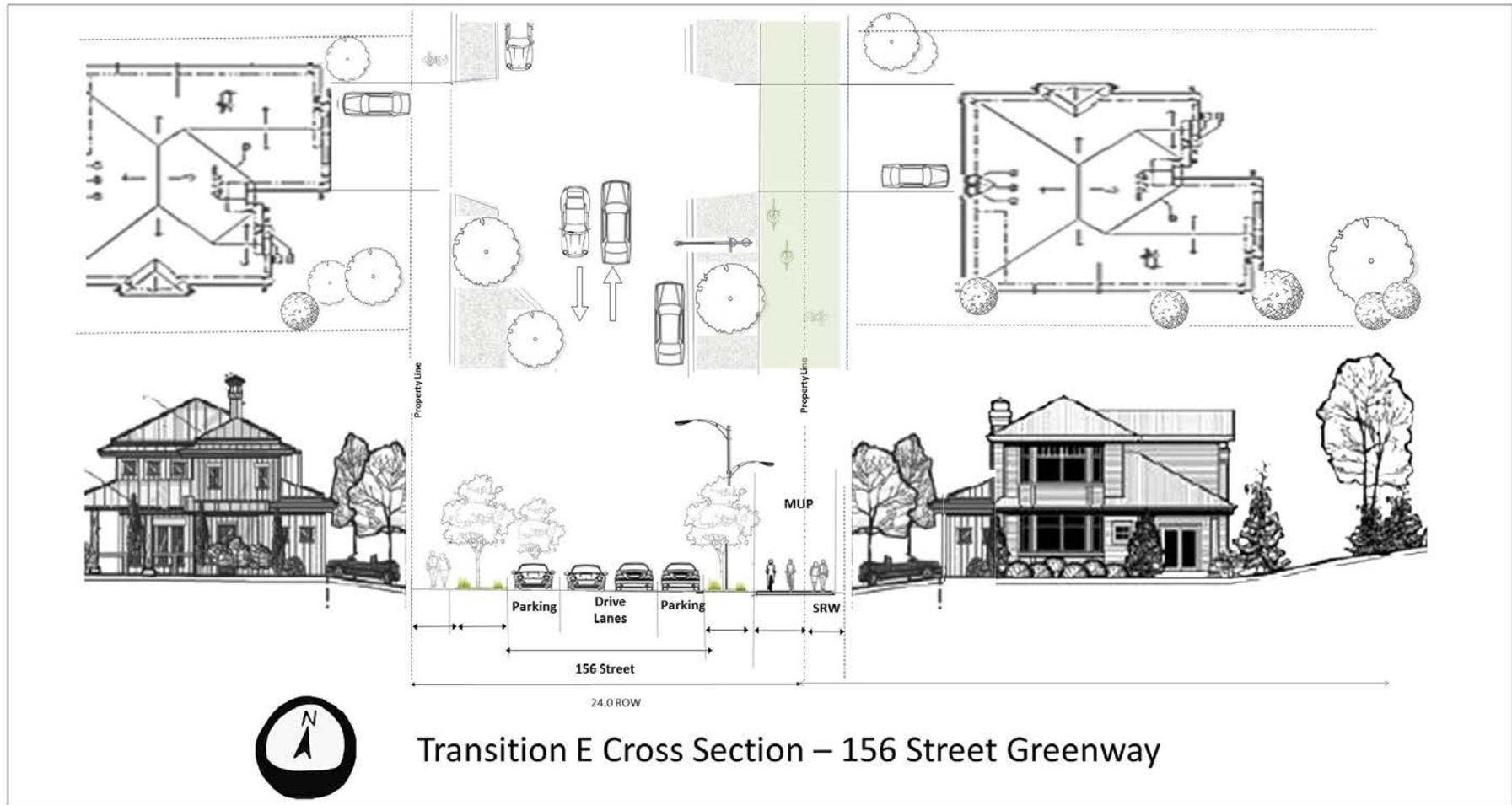


Cross Section 3 – Transition D 154 St Adjacent to Golf Course

2.6.5.4 *Transition E: Adjacent to 156 Street Multiuse Pathway*

A four meter wide multi use pathway will form part of 156 streets, as part of the 156 Street Greenway. A 2.0 meter Statutory Right-of-way will be established along the east side of 156 from 78A Avenue to Surrey Lake Park as shown in the detail below and on the south side in the future Infill Area south of the unopened 70 Avenue right-of-way. The east and west side of 156 Avenue, after redevelopment, is expected to include front loaded single family homes.

See **Cross Section 4 – Transition E 156 Greenway Drawing** for details.



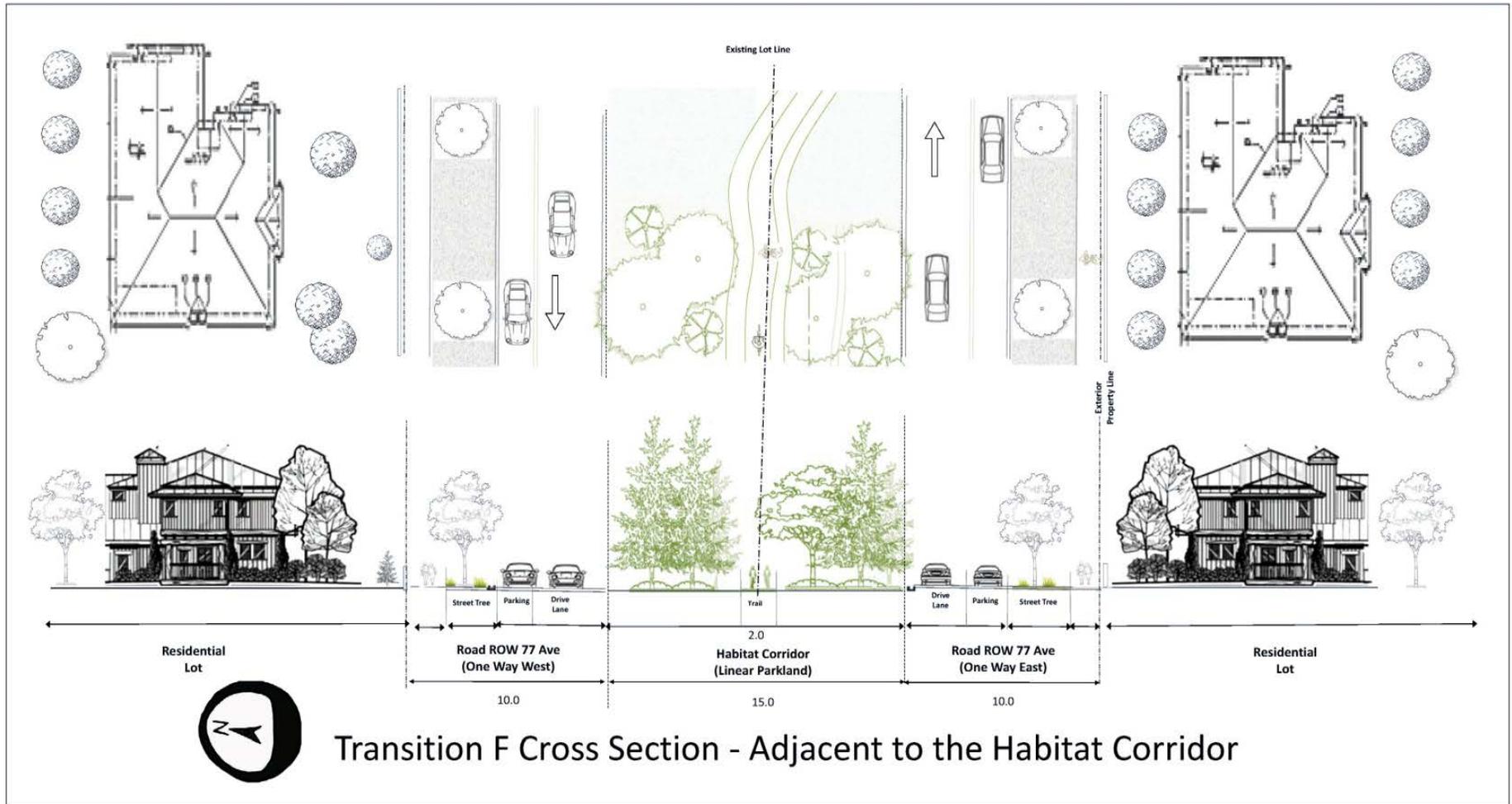
Cross Section 4 - Transition E -156 Street Greenway

2.6.5.5 Transition F: Adjacent the Habitat Corridor

A 15 meter East- West Habitat Corridor will be located within the centre Boulevard of 77 Ave. Given the high ecological significance and purpose of the Habitat Corridor, special care must be taken in the design of 77 Ave adjacent to the Habitat Corridor as well as the park pathway within the Habitat corridor. Access and tree protection within the natural areas should be carefully managed to avoid impacts to soils and retained trees. A 2 meter gravel pathway will meander within the Habitat Corridor providing access to Fleetwood Park and 156 Street greenway.

The majority of houses will contain side yards which will flank 77 Ave except for south west of 155 Street, where housing will front onto the south side of 77 Ave.

See **Cross Section 5 – Transition F Habitat Corridor Drawing** for details.



Cross Section 5 – Transition F Habitat Corridor Interface

2.6.6 Ecosystem Management Opportunities

Approximately 15 Acres (24%) of the Plan Area is within the Fleetwood Park Hub (#23), and 22 Acres (35%) of the Plan Area contains EMS Sites as identified in the Surrey Ecosystem Management Study (EMS). The EMS area portions of the plan area are made up of mainly-natural (42%) vegetation cover comprised of closed-canopy Deciduous and Evergreens trees. The total overall size of the (Fleetwood Park) Terrestrial Hub is 120 Acres, and has been classified with an ecological significance score of 60/100, ranked #31 out of a possible 88 total Terrestrial Hubs in the City, with an important habitat 'ecosystem' corridor opportunity connection to Surrey Lake Park Hub (#20) to the south in the ALR.

See **Figure 6 – Ecosystem Management Study Green Infrastructure Network Areas Map.**

The Infill Area plan (**Figure 4**) conserves approximately (9 Acres) of the subject sites EMS Hub, site area as in the form of a Habitat Corridor (1.8 Acres), Open Space (5.6 Acres), Park Buffer (4.2 Acres), Landscape Buffers (1.2 Acres) and Multiuse Greenways (0.6 Acres); which is 20 % of the total plan area, or 23 % of the Existing EMS areas.

See **Figure 7 - Proposed Green Infrastructure Areas Map.**

Section 4 of the Surrey EMS describes these Terrestrial Habitats, serving highly important ecological functions, ranging from water purification and erosion protection, to habitat for birds and small terrestrial wildlife which represent good candidate areas for ecological protection and restoration as part of development, as some areas remain degraded from past land clearing and development activities. Trails, utilities and other access to the Fleetwood Park Hubs should be planned in ways that limit disturbance to the species resident in the hub. Trails may be restricted to adjacent lands or outer limits, so that core is undisturbed.

2.6.7 Habitat Corridors

The Fleetwood Enclave plan includes a local habitat corridor connection between Fleetwood Park and Golf Course Lands with connection to the Surrey Lake terrestrial Hub. An additional secondary corridor connection along the ALR Boundary also helps reduce risks to biodiversity, and wildlife movement. Preference to the East West Corridor location was given to protecting or restoring continuity of the corridor with higher ecological significance shown in **Figure 9 of Ecosystem Management Study, and Figure 10 – Fleetwood Enclave Habitat Corridors Assessment**, and in the Diamond Head Environmental Study Wildlife Corridor map. The Habitat Corridor is along existing wooded sites. The 'minimum' width of the habitat corridor is 15 meters was determined based on detailed biological studies of the species that are or could use the habitat provided by the lined hubs and corridors.

See **Cross Section 5** for details on Habitat Corridor Interface.

Where roads or other barriers are being constructed or rebuilt, provisions for ease of passage wildlife species that the corridor serves should be provided, such as restricting road

access through the corridor where possible, and re-vegetation (naturalization) of utility corridors to enhance important linear connections between hubs and sites. For example, where the east west wildlife corridor crosses 155 and 156 Street, efforts should be made to include a narrowed paved surface that may include roadway bulges.

These rights-of-way may be developed for wildlife and other ecological values; for example, the corridors with overhead power lines are ideal location to manage for old field habitat, rather than re-establishing tall tree cover.

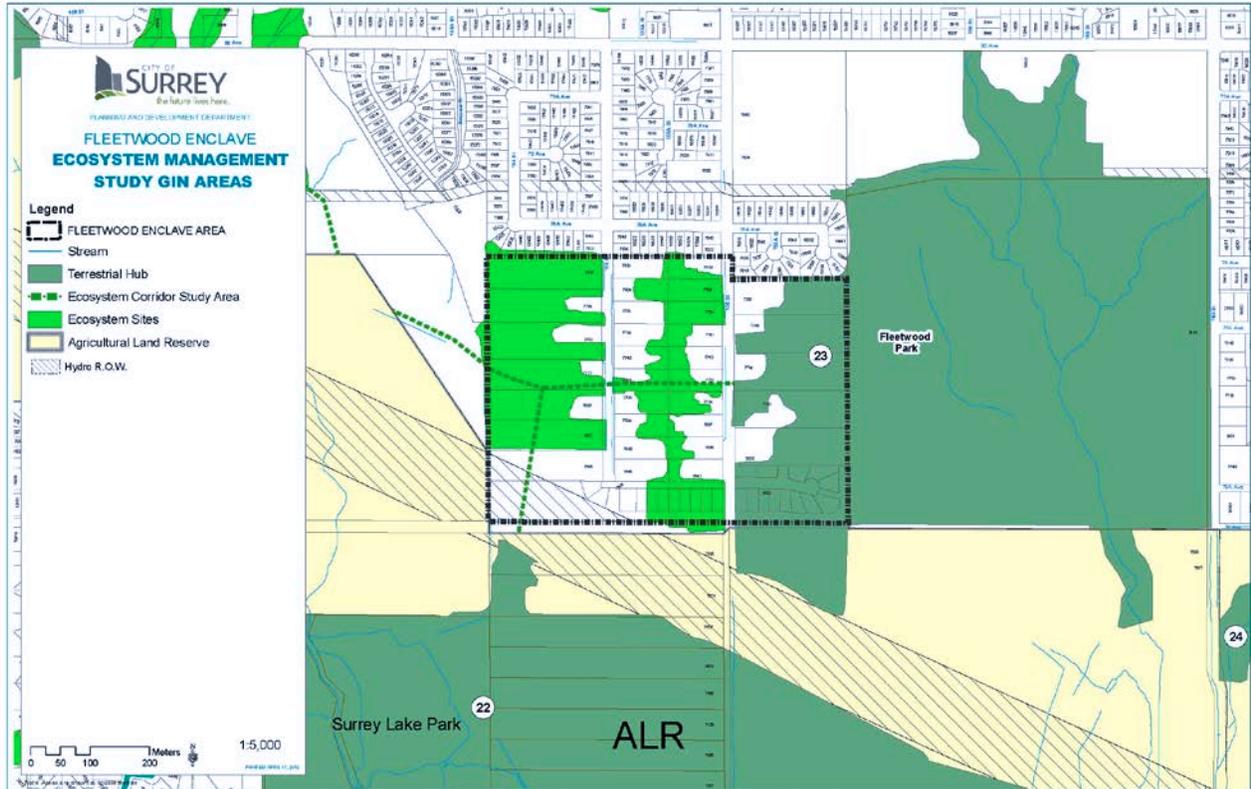


Figure 10 - Ecosystem Management Study Green Infrastructure Network Areas



Figure 9 - Fleetwood Enclave Habitat Corridors Assessment

2.6.8 Parks, Recreation, Trails and Open Space

The Fleetwood Enclave Plan establishes an open space and trail network that provides passive and natural area parkland, as well as active connections between the plan area and adjacent community amenities. The network takes advantage of the Surrey Lake Greenway's alignment, as well as the plan area's adjacency to Fleetwood Park, the Eaglequest Golf Course and the Agricultural Land Reserve.

Along the eastern edge of the plan area a 25m parkland buffer will provide a natural areas addition to Fleetwood Park. A new park entrance at the eastern end of 77 Ave will include a small open space and picnic area, as well as a 3.0m gravel pathway connection east to existing amenities within Fleetwood Park. A secondary park entrance at the eastern end of 76A Ave will provide a 2.0m pathway that will connect north-east to the primary pathway within the Park. A 2.0m gravel pathway will also run along the eastern edge of 157 Street in lieu of a sidewalk. The interface with Fleetwood Park will remain primarily natural to retain and take advantage of existing forest canopy.

A 15m planted median within 77 Ave will address an important east-west habitat corridor and linear green space. A 2.0m pathway will provide an extension to the Fleetwood Park connection through the median. The pathway will meander to enable maximum tree retention. At 156 Street, where the corridor intersects the Surrey Lake Greenway, a small amenity node will provide seating and wayfinding. Along the western edge of the plan area a parkland buffer, averaging 25m in width, will provide a natural area interface with the Eaglequest Golf Course. This buffer will form the western end of the east-west habitat corridor and provide a habitat link to Bear Creek. The buffer will also ensure the retention of an important south-west view corridor over the golf course, Bear Creek and the Agricultural Land Reserve.

A 2.0m pathway along the western edge of 154 Street will provide local circulation and access to passive park space and picnic areas that take advantage of the views. Along the southern extent of the plan area natural area parkland will provide a buffer between development and the Agricultural Land Reserve.

Table 10 indicates the areas allocated, and **Figure 11** shows the location of various components of the Public, Park, Trails and Natural Areas network. The network serves both ecological and social purposes by supporting the surface drainage system, providing sufficient avian and terrestrial wildlife habitat, maintaining surface flows, and providing areas for both passive recreation.

Public and Natural Areas (Land Use Type)	Hectares	Acres	% of Total Plan Area
Passive Parkland Buffer along ALR Edge (Existing Dedicated Parkland)	2.08	5.14	7.9%
Fleetwood Park Extension (Treed Linear Open Space - Parkland)	0.77	1.90	2.9%
Western Edge Parkland (Treed Linear Open Space - Parkland)	1.03	2.56	3.9%
East-West Habitat Corridor (Linear Parkland)	0.71	1.75	2.7%
156 Street Greenway (4.0 m Multiuse Pathway)	0.12	0.31	0.4%
TOTAL	4.72	11.66	17.9%

Table 10 - Public, Park and Natural Areas

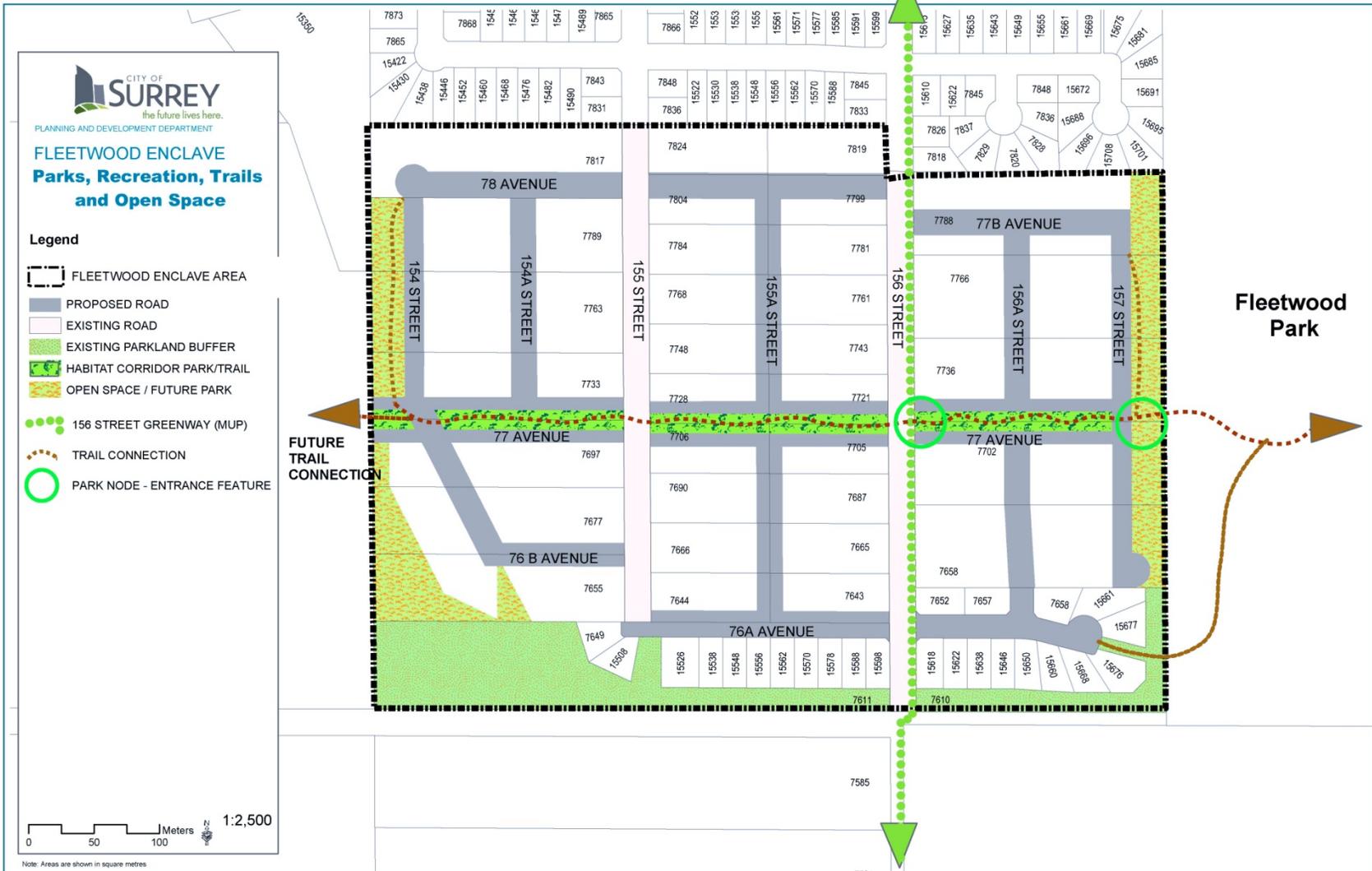


Figure 11 - Parks, Recreation, Trails and Open Space

2.6.9 Pedestrian Circulation

The proposed circulation system is shown on **Figure 12: Pedestrian Circulation Plan**. It is a fine-grained combination of sidewalk and walkway connections through the neighbourhood, connecting to adjacent multi-use paths along 156 Street and the East West Wildlife Corridor trail, as well as direct access to adjacent parkland and the existing urban neighbourhood and schools to the north. In addition, there are paths through the local parks as part of the local circulation system.

- The multiuse pathway connection along 156 Street is proposed to be 4.0meter wide partially within 2.0 meter wide Statutory Right-of-way along the eastern fronting lots.
- A 2.0 meters wide gravel pathway will be provided within the median of the East West Habitat Corridor.
- Bicycles will be accommodated within the neighbourhood primarily on local traffic calmed roadways and through connections to the overall Surrey greenway system.
- Pavement treatments will be provided where the pedestrian circulation network crosses streets.
- Walkway locations are conceptual and the Planning & Development, Engineering, and Parks, Recreation & Culture Departments will determine final design jointly.
- Driveways will be paired to limit potential conflict with pedestrians on sidewalks.



Figure 12 -Pedestrian Circulation Plan

2.7 LAND USE AND POPULATION STATISTICS

A statistical summary of each of the land use components of the Land Use Concept for the Infill area, dwelling units, and population projected is shown below.

Table 11 – Statistical Summary and Projected Build out Scenario for the Fleetwood Enclave Plan Area

Fleetwood Enclave Build out Scenario							
Land Use	Acres	% of Area	Principal Units	*Principal Unit Population	Secondary Suites	*Secondary Suite Population	Total Population
EXISTING ROADS	3.9	6%	0	0	0	0	0
PROPOSED ROADS	12.7	20%	0	0	0	0	0
PROPOSED PARKLAND BUFFER	5.1	8%	0	0	0	0	0
HABITAT CORRIDOR	1.8	3%	0	0	0	0	0
CLUSTER OPEN SPACE/FUTURE PARK	4.4	7%	0	0	0	0	0
LANDSCAPE BUFFER (RC)	1.0	2%	0	0	0	0	0
EXISTING SUBURBAN CLUSTER 2 U.P.A.	4.5	7%	24	77	24	44	121
1/4 ACRE GROSS DENSITY 4 U.P.A.	13.9	22%	79	254	79	95	262
LOW DENSITY URBAN CLUSTER 4 U.P.A	7.6	12%	52	168	52	95	646
LOW-MEDIUM DENSITY CLUSTER 5 U.P.A	9.7	15%	85	263	85	155	418
TOTAL	64.7	100.0%	240	762	232	437	1,199

* Population of Principal Unit is based on 3.229 People per Dwelling

** Population of potential Secondary Suites based on 1.82 People per Secondary Suite Dwelling

2.8 LAND CONSOLIDATION AREAS

Land consolidation areas have been identified to advise future developers of consolidation requirements and to ensure feasible development areas which achieve an equitable distribution of road dedication, land development, and construction costs.

Land consolidation may be required for:

- small acreage parcels;
- encumbered properties with little development potential;
- cluster designation areas;
- sharing road construction costs.

Within the plan area there are a number of parcels where lot consolidation is required in order to develop. These land consolidation opportunities can often be determined on a case by-case basis at development application stage. In some cases, however, pre-determined consolidation requirements are identified in the Land Use Plan in order to avoid creating remnant pieces that could not develop on their own. These particular properties should be developed together through consolidation and land assemblies or through coordinated development.

If land consolidation is not possible during the development process, the developer must:

- Demonstrate that the development potential of the excluded property is not compromised; and
- Share road construction costs amongst properties shown in the land consolidation area.

Consolidation areas are identified in **Figure 12**.

2.9 ZONING BYLAW VARIATIONS

The implementation of the Fleetwood Enclave infill development concept strategy will require variations of some existing Zoning Bylaw regulations (probably through the use of comprehensive development zones), based on the Residential Cluster (RC), Residential Single Family Gross Density (RF-G) and/or Residential Half Acre Gross Density (RH-G) Zones, including variations to:

- front and rear yard setback dimensions;
- density limits and floor space ratios;
- site coverage maximums;
- minimum lot size, width, and depth requirements; and
- minimum open 'Green Space' dedication percentages.

2.9.1 Cluster / Gross Density Zones

Gross density cluster developments, consisting of single dwellings, and in some instances duplexes, are permitted in Urban and Suburban designations as a means of preserving significant open space, subject to overall density restrictions as per OCP Policy 3.5.2.

Surrey's Zoning Bylaw by means of the Residential Cluster (RC) Zone, Single Family Gross Density (RF-G) Zone, and Residential Half Acre Gross Density (RH-G) Zone, permits lot area averaging within a subdivision. This provision provides that parcels within an area below the specified minimums may be created as long as the average area of all parcels in the subdivision is greater than or equal to the minimum. Such provision or related provisions within an associated Comprehensive Development (CD) Zone can be used to permit the clustering of the development on larger parcels, which can be used to set aside environmentally sensitive areas and/or woodlands, with defined green 'open space' areas from development, as identified in the Fleetwood Enclave Infill Area Land Use Plan.

Cluster and Gross Density areas include the possibility of provisions to include a minimum average lot area for any park, open 'green space', road, and wildlife corridor areas within the parent parcel within the new area plan as an incentive to use lot area averaging cluster designation.

Part 3: Design Guidelines

3.1 OVERALL DESIGN PRINCIPLES

- 3.1.1 To create an identifiable and sustainable community of high visual quality, lasting value, and character through architectural coordination, details and material selection.
- 3.1.2 To develop a distinctive public realm with a sense of place that is not just conventional subdivision park or green space, but a carefully designed walking network of interconnected local roads which face onto green space to create an interactive, pedestrian friendly and safe community environment.
- 3.1.3 To develop a distinctive private realm of defined public, private and semi-private yards, terraces, porches and residential buildings that will complete the street enclosures and vistas to create a strong street edge.
- 3.1.4 To have a diversity of physical environment: private and public spaces, integration of natural topography, trees and habitats, connected city park system and a differentiated arrangement of street and character areas.
- 3.1.5 To encourage a mix of compatible housing designs that accommodates a diversity housing styles.
- 3.1.6 To use residential building design that provides an enjoyable pedestrian scale and character.
- 3.1.7 To encourage a pedestrian friendly environment with convenient access to park areas, transit areas along 152 Street and 80 Avenue, Schools and other destinations.
- 3.1.8 To incorporate natural on and off site drainage and rainwater management techniques.
- 3.1.9 To preserve existing significant tree habitat and canopy coverage, where practical.
- 3.1.10 To provide traffic calming through the use of minimum road widths at all intersections and circular landscaped islands on through roads.
- 3.1.11 To develop a distinct but connected residential neighbourhood that is comprehensively designed for an aesthetically pleasing place to live, live and work and play.
- 3.1.12 To ensure improved access to both private outdoor living spaces and public open spaces in adjacent Fleetwood and Surrey Lake Parks.

3.1.13 To develop streets that will encourage walking and pleasant views with trees and street furniture where appropriate for rest and comfort.

3.1.14 To develop the general residential character by means of a variety of building setbacks, private outdoor space created by low front property line boundary landscape buffers, and road design.

3.1.15 To develop street specific built character to coordinate such elements as siting, massing for site specific lots, exterior finishing materials and colors for single family housing.

3.1.16 To provide an architectural control and review process to ensure diversity of built form and material composition detailing as set out in the building scheme at time of rezoning.

3.2 DESIGN GUIDELINES FOR STREETS

3.2.1 Roads should be throated down (with curb extensions) at intersections where possible to calm traffic.

3.2.2 Any Roundabouts and/or traffic circles in the through local roadway will define key character intersections and contribute to one's sense of orientation a progression within the neighbourhood.

3.2.3 The size and configuration of the roundabout, traffic circles, traffic calming throats, sidewalks and location of parking will be determined at the detailed design stage when the layouts of lots and driveways are finalized.

3.2.4 Street lighting will be installed similar in architectural character to the residential development and will be to Engineering Department standards.

3.2.5 On street parking will be in parking bays where possible.

3.3 DESIGN GUIDELINES FOR STREET TREES

Objective

3.3.1 Trees are a major landscape element that makes the development special, unified and softens the built form.

Street Tree Design Strategies

3.3.2 There will be a specific order as to type and ultimate height and scale of trees to correspond to specific street boulevard functions and abutting residential housing scale.

- 3.3.3 Boulevard tree planting will be developed through consultation with the Parks and Recreation Department in terms of species selection and ultimate height, caliper installation sizing, color and flowering, planting patterns and spacing, installation detailing and maintenance requirements, all to meet boulevard tree planting standards.
- 3.3.4 Trees will not be planted within 0.6 m of curbs.
- 3.3.5 Tree planting on front yards will be coordinated with boulevard tree locations to avoid conflicts and to provide suitable front door viewing.
- 3.3.6 One front lawn tree will be planted on single-family lots with a frontage less than 20.0 m and will be included within the tree replacement plan required for the Fleetwood Enclave.

3.4 DESIGN GUIDELINES FOR SINGLE FAMILY DETACHED HOUSING

Objective

- 3.4.1 While the public realm of streets will begin to establish Southwest Fleetwood's urban character, it is the private realm of defined yards, terraces, porches and residential buildings of various types that will complete the street enclosures and vistas and create a strong street edge. Housing will be street oriented and porches will be encouraged.

Single Family Detached Housing Strategies

- 3.4.2 While the developer will establish design guidelines for the various housing types and locations, the theme will be a variety of architecturally coordinated yet differentiated buildings.
- 3.4.3 Special consideration will be given to homes adjoining intersections, roundabout and traffic circles, open space areas and transitions from lower density single family homes urban density single family homes, and the central wildlife corridor.
- 3.4.4 Architectural detailing referring to material selection, application of accenting elements, wall face applied versus set in windows, etc., will be considered as part of the builder's guidelines for the purpose of establishing massing, shadows, depths and most importantly building value.
- 3.4.5 Considering the material development of the boulevards, the low bordering landscape fence and contributing landscaping, the foremost element of the single family home will be the front door element for scale and expression of style.
- 3.4.6 The second element in the evolution of the Southwest Fleetwood Enclave home will be the lowering of the second floor roof to integrate with entry porches an arbour for a more human scale versus a conventional two-storey wall with buildouts.

- 3.4.7 The residential built character will demonstrate a ‘hand crafted’ approach featuring such elements as entrance doors, windows, and corners and employing smaller scale elements as bricks and shingles.
- 3.4.8 The design, composition and materials for the front entry are to be consistent with the overall style of the home. Limited use of cultured stone as an accent material may be permitted.
- 3.4.9 Garages with doors in a compatible color and style to the house are required.
- 3.4.10 Garages must be set back from the front face of the dwelling and may be lowered or otherwise subordinated to the front entry.
- 3.4.11 In order to mitigate the impact of the garage door to the street, the garage should not exceed 50% of the width of the house front elevation. On corner lots, the garage driveway should be provided from the secondary road where practical.
- 3.4.12 Walls may be clad in a variety of materials including vinyl subject to individual dwelling approval, location, color choice and detailing. Specific provisions to prevent unbroken two-storey sheer walls, overuse of vinyl and inappropriate color choices will be provided.
- 3.4.13 Colors of wall materials and trim must be selected from a color and repetition palette supplied by the developer or his agent. Basic white will not be permitted and off-white as a body color will be permitted on a limited basis.
- 3.4.14 Rooflines, materials and colors, soffit details, gutters and fascia trim will be controlled by the building scheme to ensure continuity.
- 3.4.15 Front yards will be fully landscaped at the time of building completion and prior to occupancy to ensure an appropriately finished street appearance and for street cleaning purposes.
- 3.4.16 Driveways will be paired wherever possible with landscape finishing between driveways and continuity of sidewalks will be maintained.

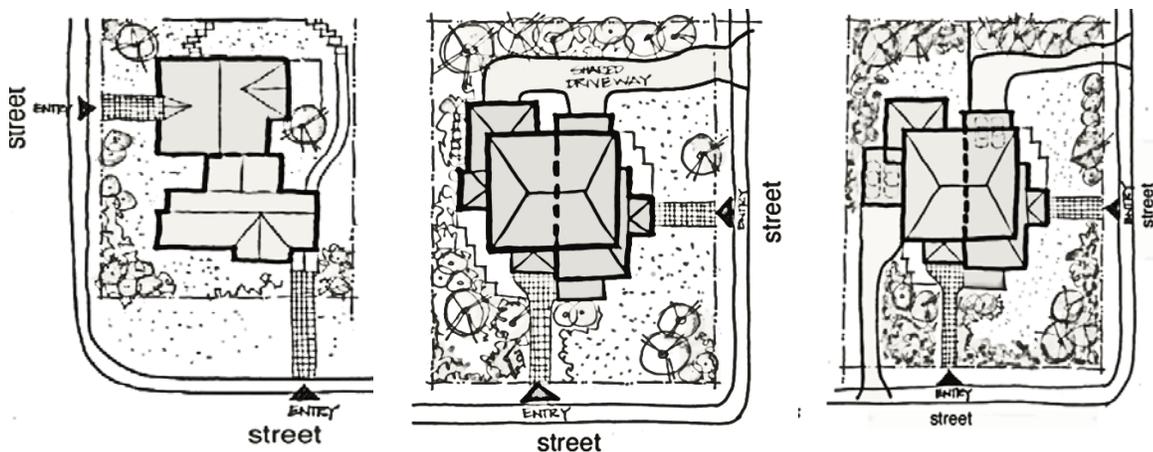
Fences

- 3.4.17 Solid wood materials are required in a style and stain finish for overall style consistency.
- 3.4.18 Low, landscape style open or transparent fencing only is permitted within the projected side yard of front yard areas as an alternative to hedging or on the soft landscaping material to a maximum height of 0.60 m.
- 3.4.19 Traditional solid fencing (to Zoning Bylaw standards) will be required on the flanking side of corner lots for rear yard privacy and streetscape control. In any event, such fencing may only extend to cover the rear portion of the flanking

street and must be augmented with landscaping along road and fence. Flanking fences should be setback a minimum of 0.6 m to allow for additional landscaping.

3.5 DESIGN GUIDELINES FOR SINGLE FAMILY DUPLEX HOUSING

- 3.5.1 Duplex Dwellings on corner lots should be designed to “face” both streets, i.e. provide an entrance to one unit from the primary street, with the entrance to the second unit from the flanking street.



Drawing 1 - Corner Lot with entrances facing both streets

3.6 DESIGN GUIDELINES FOR DEVELOPMENT ABUTTING PARKS & OPEN SPACE

Objectives

- 3.6.1 The objective is to encourage an open, integrated public interface while respecting the transition between public and private realms.

Design Strategies

- 3.6.2 Specific architectural guidelines for the single family lots will be developed during the rezoning process, that will specify open space preservation and single loaded fronting lots facing the green open space areas and parkland, and encouraging balconies overlooking parks. Finished floor elevations will be established 0.6 to 0.8 m above the park elevation where possible.

3.7 DESIGN GUIDELINES FOR BUILDINGS

- 3.7.1 The site layout and design of the building and open space should be based upon the principles of defensible space and provide ample opportunities for casual surveillance of public spaces (CPTED).
- 3.7.2 Site planning and building design should be responsive to the contours, vegetation and natural features of the site, and the specific conditions of the site (i.e., surrounding uses, views, noise, slopes, etc.)

- 3.7.3 The building materials and colours will be determined at time of development; however, they should be high quality and represent aesthetics of the area.
- 3.7.4 The entrance to the building should consider the use of architectural or landscaping elements that identify the threshold between public and private property. Any minor structure used for this purpose should be located at the dominant front yard setback line.
- 3.7.5 Consideration should be given to the siting and massing of the buildings in such a way that they ‘anchor’ the intersection, site, corners, edges and act as a gateway into the neighbourhood.
- 3.7.6 The articulation of the roofs should reflect and be similar to the adjacent residential buildings.

3.8 DESIGN GUIDELINES FOR PARK AREAS

Park and Open Space Design Policy

- 3.8.1 The City of Surrey Parks, Recreation and Culture Department will be responsible for all design and development within open space and buffer area designated to parks. Details will be finalized at the time of development.

Park Design Strategies

- 3.8.2 The nature park opens ‘Green Space’ areas along Fleetwood Park and Golf course Lands will be maintained as a natural woodland habitat with opportunities for low impact recreational pathway component along the eastern edge of 157 and 154 street.
- 3.8.3 The Habitat Corridor spanning the Infill Area will be dedicated and/or purchased when exceeding the parkland dedication requirements with infill areas parkland cash in lieu payments, and maintained as linear parkland with significant tree and vegetation species maintained, or planting enhancement will be provided as determined by Surrey Parks, Recreation and Culture Department.
- 3.8.4 Engineered storm water retention or bio-filtration areas will not be allowed in the treed open space or wildlife Corridor areas, but may be permitted in curb buldges.
- 3.8.5 A 2.0m pathway will meander through the Habitat Corridor area to minimize impact on existing natural environment and on the adjacent residential lots.
- 3.8.6 Permanent hard fencing will be erected at the private property lines along parks by the developer as soon as possible in the development process.
- 3.8.7 Existing tree stands in all park areas will be retained where appropriate.
- 3.8.8 Special park amenities and/or structures may be determined by Surrey consultation with the community.

Part 4: Implementation

4.1 OFFICIAL COMMUNITY PLAN AMENDMENTS

The entire area covered by the Fleetwood Enclave Infill Area Plan is currently designated Suburban in the OCP. In Suburban Designated Areas with full services and where a Neighbourhood Plan is in place, the Surrey OCP indicates, in Section 3.6, that a minimum ½ acre lot size, including gross density, where applicable is permitted. This may be increased to 10 units per hectare (4 units per acre) where development with this density is a minimum of 200 metres from the edge of the Agricultural Land Reserve.

Amendments to the OCP will therefore be required for lots within 200 meters of the ALR, where densities of 4 units per acre or greater are proposed and all lots outside 200 m where densities of 5 units per acre are proposed. Amendments will likely take place in phases as owners wish to proceed to re-designate lands for the appropriate “Urban” Residential densities and uses.

4.2 REZONING

The residential lands will need to be rezoned before development can proceed. Rezoning will be completed in a logical staged manner. Areas suitable for development may be rezoned when owners make application consistent with this Infill Area plan.

4.3 SUBDIVISION

Future subdivision will be consistent with both the Infill Area plan and the ultimate zoning. As noted in the section on phasing, subdivision will be dependent upon market conditions and at a pace determined by the landowners. Detailed subdivision patterns will be determined at the subdivision application stage.

4.3.1 Dedication of Parkland

The *Local Government Act (LGA)* requires the dedication to the City of Surrey without compensation of up to five per cent of land being subdivided as park land, unless the subdivision creates fewer than three additional lots (except if lot being subdivided was created within the last five years), creates lots each of which is larger than two hectares, or is merely consolidating existing parcels.

The City of Surrey Parks, Recreation and Culture Department will determine the location and amount of land being provided under s. 941 of the *LGA*, under guidance of this Infill area Plan.

Lots with special characteristics, such as mature vegetation, watercourses, or other features worthy of preservation and/as indicated in this Infill Plan that are

designated for Cluster Housing, may require substantial public open space be set aside within the subdivision to achieve gross densities calculated on the basis of the entire lot (Including undevelopable areas).

4.3.2 Money in Lieu of Parkland Dedication

In some cases, the *Local Government Act* permits the payment of money in lieu of dedicating park land, at the owners option, except where the City of Surrey OCP and/or other Plans and policies, (such as the Infill Area Plan) and designations respecting the location and type of future parks, in which case Surrey Parks, Recreation and Culture may dictate whether land is dedicated or money paid, as per the Fleetwood Enclave Infill Plan park dedication areas.

4.3.3 Parkland Allocation Process

Parkland must be dedicated or the money paid in lieu of before the subdivision is approved, unless a park land agreement is entered into between the City of Surrey and the subdivision applicant. Such an agreement must require the dedication of the land or the payment of the money by a specific date, and notice of the agreement must be filed in the Land Title Office in the same manner as a permit under Part 26 of the *LGA*. The agreement is binding on the applicant’s successors in title.

4.4 DESIGN GUIDELINES

The Infill Area Plan contains design guidelines for land uses that are intended to provide general direction to achieve the desired neighbourhood character, preserve and enhance natural space, encourage pedestrian access to destination areas, and achieve the overall development objectives defined in the final Infill Area Development Concept Plan.

The design guidelines make recommendations regarding the interface between residential areas and the public street, residential areas and agricultural lands, viewscales, green space management areas, transition areas, stormwater corridors and on-site drainage works, as well as architectural elements appropriate for residential buildings.

These guidelines will be used by City staff to guide the developers in coordinating the design among individual rezoning/development applications and to ensure that the desired neighbourhood character is achieved in the Fleetwood Enclave. The Design Guidelines will be implemented through Building Schemes for single family developments, which will be registered on the lots and administered by design consultants hired by the developers and approved by the City

4.5 COMMUNITY SERVICES AND AMENITY CONTRIBUTIONS

To address the amenity needs of the proposed new development in the Fleetwood Enclave, 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, open spaces and pathways.

The monetary contributions toward police, fire and library materials 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 Concept Plan or Infill 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 Infill area. The total cost is divided by the anticipated number of dwelling units and acreages in the case of non-residential development to ensure an equitable contribution arrangement.

4.5.1 Parkland Development

The Fleetwood Enclave community will contain no new active park sites, but it will contain several linear parks, and addition to Fleetwood Park as natural area, multiuse pathways, trails and an east west habitat corridor. The new Natural areas will include the areas adjacent to the Agricultural Land Reserve, Fleetwood Park and the Eaglequest golf course, as well as lands within the Hydro Corridor.

The estimated cost of developing parks trails and related park amenities in the future Enclave is approximately \$258,325.20. This results in a contribution of \$1, 195.95 (in 2013 dollars) per dwelling unit.

4.5.2 Library and Library Material

A study of library requirements in Surrey's new neighbourhoods has established that a contribution of \$ 142.98 (in 2013 dollars) per dwelling unit is necessary to cover the capital costs for library materials and services, which is sensitive to population growth. Consequently, a total of approximately \$30,883.68 will be collected from Fleetwood Enclave towards materials such as books, computers, DVDs and CDs.

4.5.3 Fire and Police Protection

Future development in this neighbourhood will drive the need to upgrade existing fire and police protection facilities. A study of fire protection requirements in Surrey's new neighbourhoods has established that a contribution of \$ 274.54 per dwelling (in 2013 dollars) will cover the capital costs for fire protection. A contribution of \$ 63.56 per dwelling unit (in 2013 dollars) will cover the capital costs for police protection. This will result in a total capital contribution from the Fleetwood Enclave of approximately \$59,300.64 toward fire protection and \$13,728.96 toward police protection.

4.5.4 Summary of Amenity Funding Arrangements

A summary of the applicable amenity contributions (per dwelling unit) and the estimated revenue the City can expect to receive from the Fleetwood Infill Area is documented in **Table 12**.

The per unit amenity contributions are derived from estimated base densities in the residential designations and the number of dwelling units (excluding any secondary suites) anticipated.

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 Infill Area Plan, 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 amenity.

FLEETWOOD ENCLAVE INFILL AREA PLAN		
AMENITY CONTRIBUTIONS		
Amenity Type	Per Dwelling Unit Contribution (Approx. 216 DUs)	Anticipated Revenue
Police Protection	\$63.56 per dwelling	\$13,728.96
Fire Protection	\$274.54 per dwelling	\$59,300.64
Development of Park/Pathways and Place making Features	\$1,195.95 per dwelling	\$258,325.20
Library Materials	\$ 142.98 per dwelling	\$30,883.68
Total Contribution (per unit)	\$1,677.03 per dwelling	
Total Anticipated Revenue		\$362,238.48

Table 12 - Amenity Contribution Summary

4.5.5 Zoning Bylaw Amendment (Amenity Fees – Schedule G)

To enact the amenity contribution requirements, the Zoning By-law requires an amendment to add the Fleetwood Enclave to the list of Infill Areas within which monetary contributions are required. The proposed amendments to *Schedule F and G of the Zoning By-law*, to incorporate the amenity fees for Fleetwood Enclave, are proposed concurrently with Council approval of this Infill Area Plan.

4.6 COST RECOVERY OF INFILL AREA PREPARATION

An Environmental, Engineering Servicing and Transportation Consultant were retained to assist with the preparation of the Fleetwood Enclave Infill Area Plan. The cost of the consultant services to the City was:

Environmental Study	\$15,680.00
Drainage Study	\$37,649.22
<u>Transportation/ Traffic Study</u>	<u>\$32,666.70</u>
TOTAL:	\$86,243.62

In order to recover the Infill Plan preparation costs through the payment of application surcharge fees, the Fee Imposition By-law will be amended concurrently with Council approval of this Infill Area Plan.

The surcharge fee per unit is based on the anticipated 216 units, and would result in a per unit fee of \$399.27. Should the actual number of proposed units fall below the number anticipated on site; the applicant will be required to make up the shortfall in the surcharge fee to ensure the Infill Plan costs are fully recovered.

INFILL AREA PLAN

Engineering Servicing Strategy

DRAFT



[FLEETWOOD ENCLAVE]

This Infill Plan provides a framework for development in the Fleetwood Enclave including servicing requirements, transportation designs, parks, trails and amenity contribution rates; and will introduce new requirements at time of development application, along with the provisions for increased neighbourhood service amenities and development potential in the Fleetwood Enclave Neighbourhood.

PLEASE NOTE:

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ENGINEERING SERVICING STRATEGY

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1. General Servicing

The objective of this Engineering Servicing Strategy is to outline the servicing requirements for transportation, drainage, sanitary, and water for the Fleetwood Enclave Infill Area Plan (IAP). This report supplements the Planning and Development Department's Fleetwood Enclave Infill Area Concept Plan, which was approved by Surrey City Council on March 11, 2013.

1.1. Servicing Principles and Guidelines

The intent of the Fleetwood Enclave IAP is to plan for residential development with green space preservation and the efficient internal movement of people. The IAP identifies future land uses, road networks, engineering servicing, and finances to guide the development in the area.

The Fleetwood Enclave IAP includes approximately 25.7 hectares (63.5 acres) of land that is bounded by single family homes along 78A Avenue to the north, the agricultural land reserve (ALR) to the south, Eaglequest (Coyote Creek) Golf Course to the west, and Fleetwood Park to the east. The land is designated Suburban in the Official Community Plan (OCP). The land use concept plan (**Figure 1**) identifies the land uses for the Fleetwood Enclave IAP, with the intent of creating a liveable, comprehensively planned residential neighbourhood based on sustainable and efficient development patterns.

The IAP was developed through extensive consultation with land owners and adjacent neighbourhood residents. Public Open Houses were held to present the information to the public and receive feedback. The feedback received was subsequently used to modify and adjust the plan.

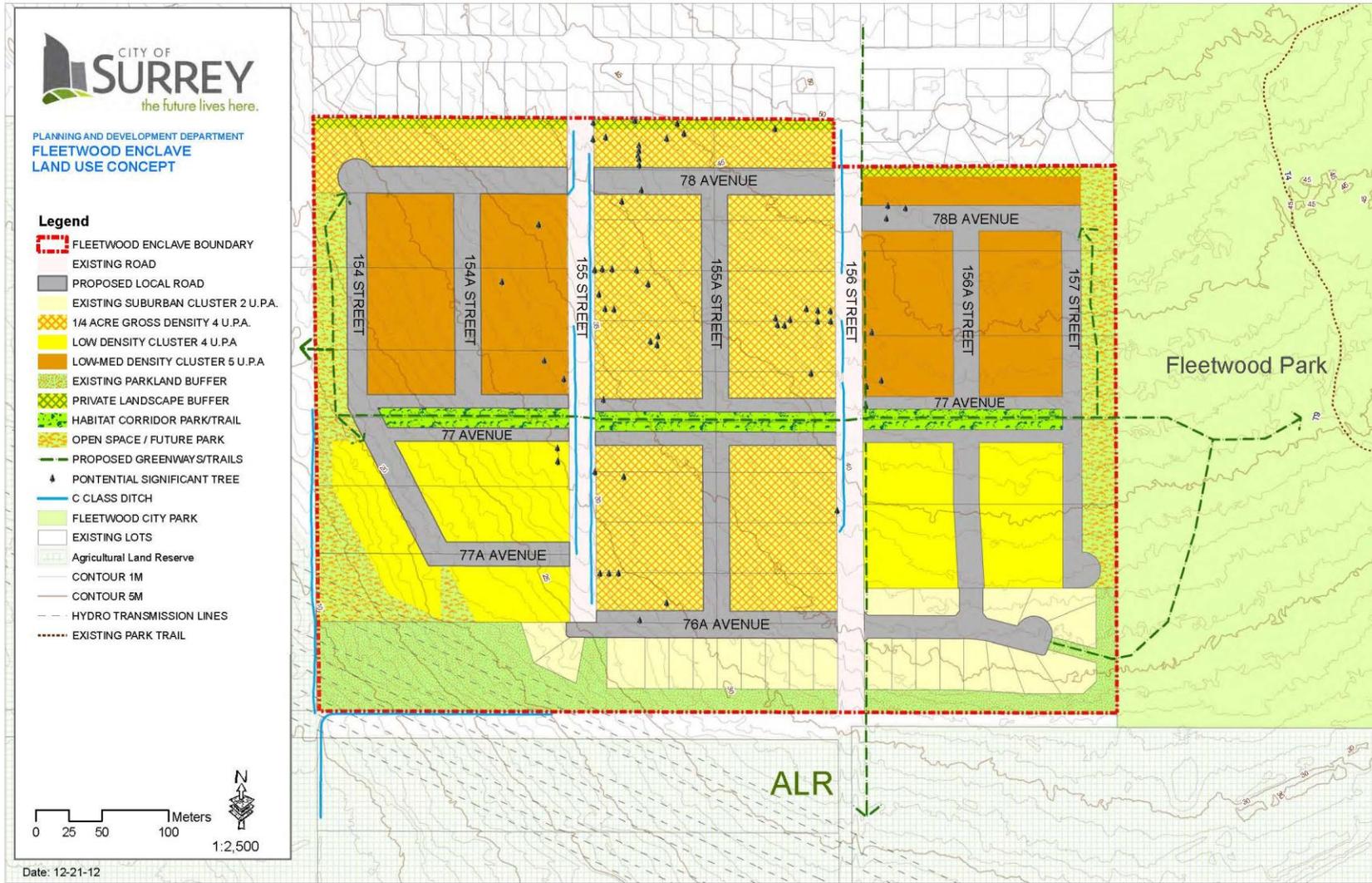


Figure 1 – Fleetwood Enclave Land Use Concept Plan

2. Transportation

This section of the report describes the current and proposed transportation networks, traffic conditions, and the transportation improvements required for the development of the Fleetwood Enclave IAP. Evaluations were conducted, on the current traffic conditions and the future traffic generated by the IAP, to identify the required improvements for the transportation network.

2.1. Current Transportation Network

CURRENT ROAD NETWORK

The current road network in Fleetwood Enclave IAP consists of four (4) local roads: 155 Street, 156 Street, 156A Street, and 76A Avenue, as shown in **Figure 2**. Access to and from the area is limited to 155 Street and 156 Street to the north. 155 Street and 156 Street do not extend through to the south, ending at 76A Avenue and at the Agricultural Land Reserve (ALR), respectively.

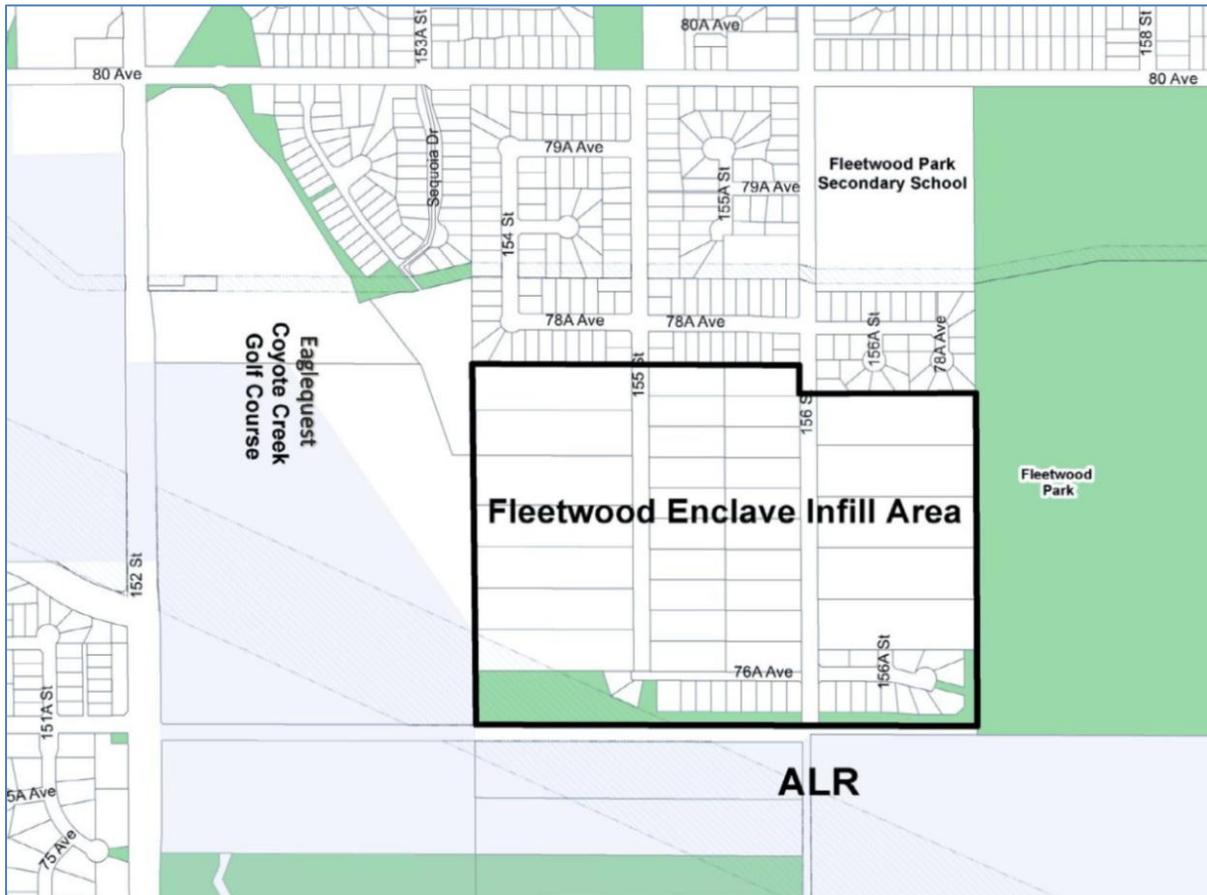
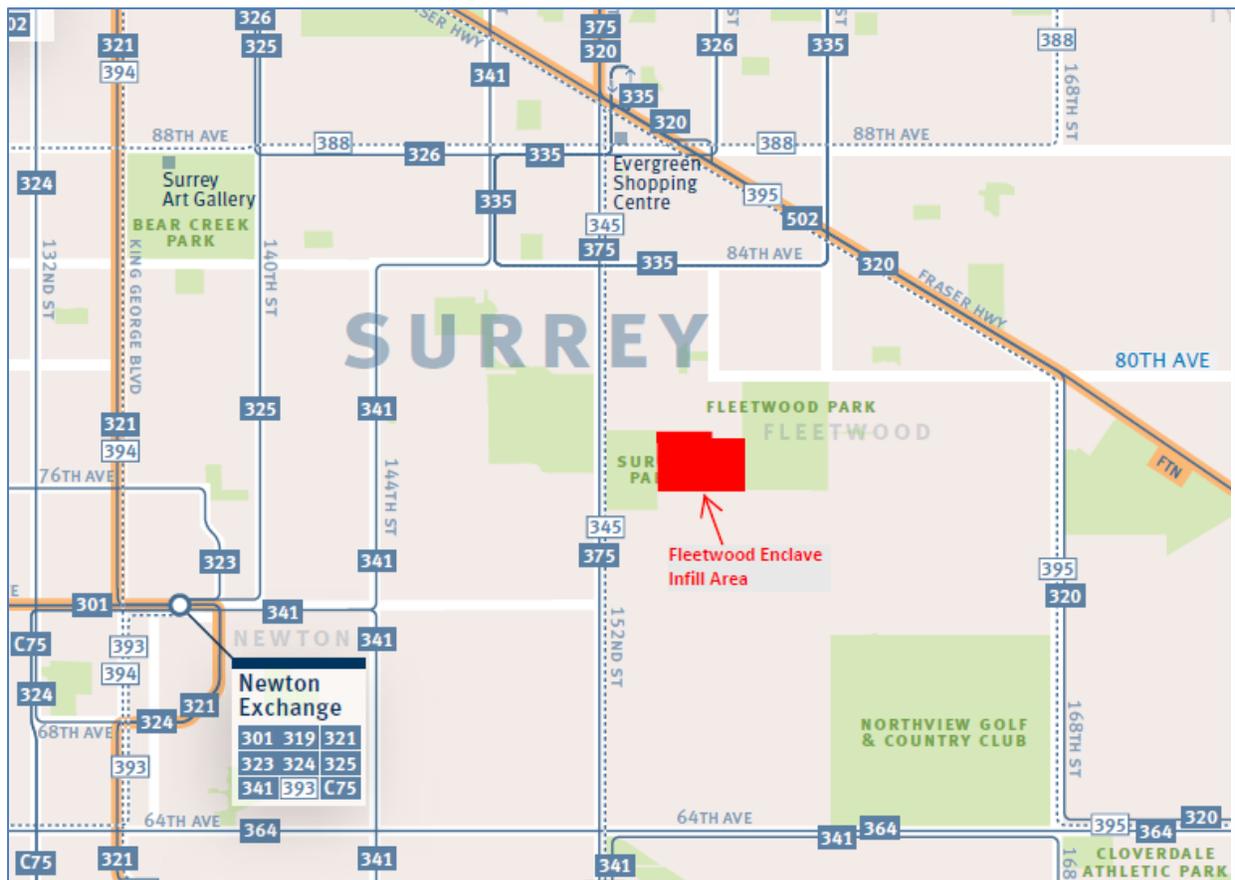


Figure 2 – Current Road Network

CURRENT TRANSIT SERVICE AND FACILITIES

According to the Translink's June 2013 Transit Map, shown in **Figure 3**, there is no bus service within the Fleetwood Enclave IAP. The nearest transit stops to the IAP with regular bus service are located along 152 Street, at 76 Avenue and 80 Avenue. Regular bus service along 152 Street provides connections to Fleetwood Town Centre and the Newton Exchange. Currently, 152 Street is not easily accessible to the IAP due to the Eaglequest (Coyote Creek) Golf Course, located between the IAP and 152 Street.

There are two transit stops located at the intersection of 80 Avenue and 156 Street, one eastbound on 80 Avenue and one northbound on 156 Street. There is no regular bus service to these stops, as they are for special school trips associated with the Fleetwood Park Secondary School.



Source: Surrey/North Delta Transit Map, June 2013, http://infomaps.translink.ca/System_Maps/90/SW_June2013.pdf

Figure 3 – Current Transit Service Map

CURRENT WALKING AND CYCLING FACILITIES

Currently, there are limited walking and cycling facilities in the IAP. The following map, **Figure 4**, shows the current sidewalk coverage in the IAP. The sidewalks along 76A Avenue were installed as part of the recent 24-lot development in the south portion of the IAP.

There are plans to provide a complete network of sidewalks, a habitat corridor, and greenways in the IAP. The proposed transportation network is discussed in **Section 2.2**.

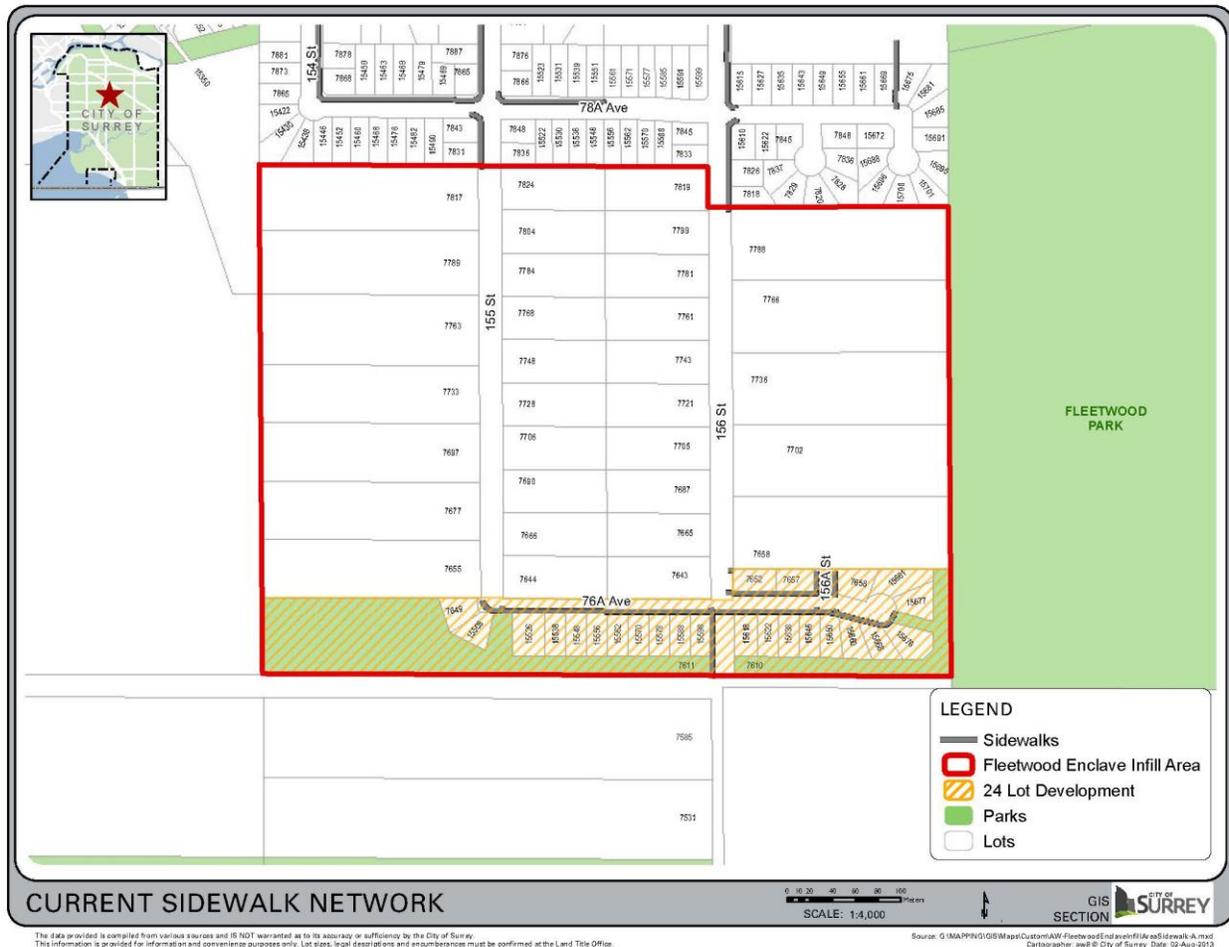


Figure 4 – Current Sidewalk Network

2.2. Proposed Transportation Network

PROPOSED ROAD NETWORK AND ROAD CLASSIFICATIONS

The proposed road network for the Fleetwood Enclave IAP is a modified grid system with a habitat corridor and green streets to encourage walking and cycling. Green streets have a flexible road alignment to protect mature trees in natural areas and to provide a buffer to adjacent parkland. The local street network proposed for the IAP provides flexible connectivity within the neighbourhood and to the adjacent transportation network. **Figure 5** illustrates the proposed road network for the IAP.

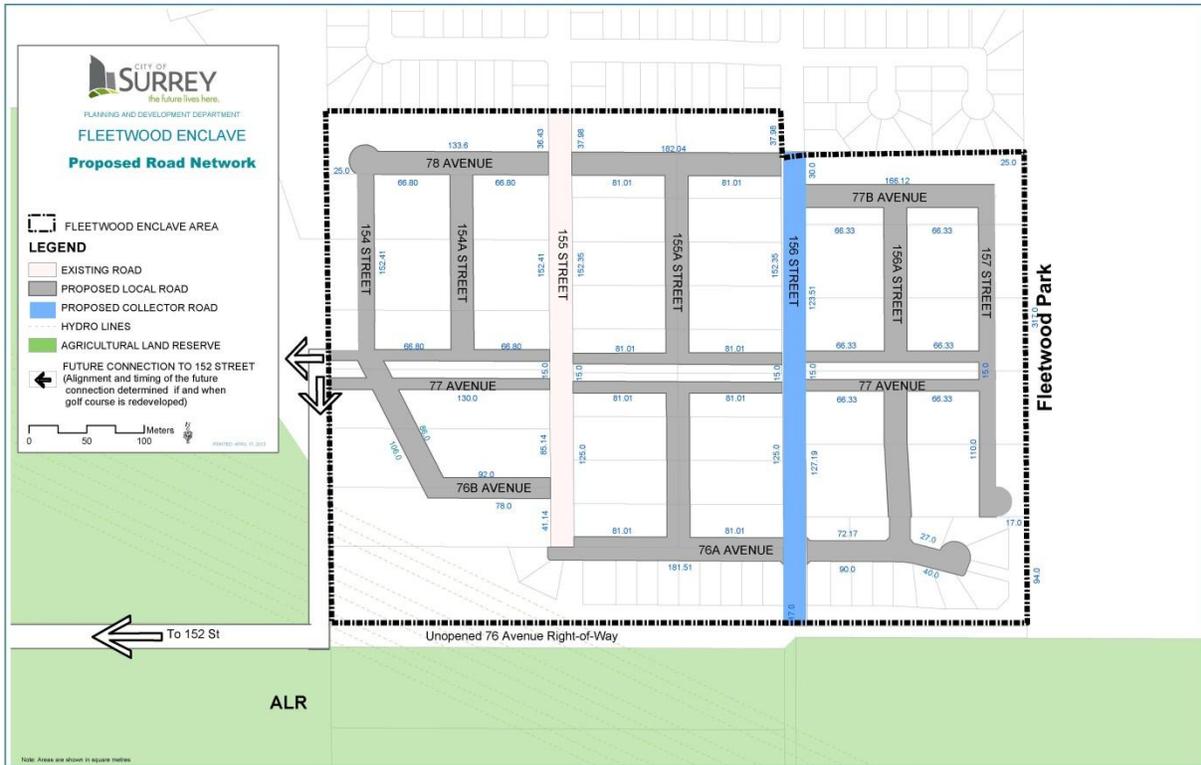


Figure 5 – Proposed Road Network

Most of the local roads in the Fleetwood Enclave IAP adhere to the City Road Standards and consist of a 20 meter right-of-way with two travel lanes, on-street parking on both sides of the road, and standard boulevards with street trees and sidewalks.

156 Street

156 Street, between 80 Avenue and 76A Avenue, will be reclassified as a standard collector road. 156 Street will have a standard 24 metre right-of-way with two travel lanes, on-street parking on both sides of the road, bike lanes, sidewalks, and street trees. The east side of the 156 Street cross-section will be modified to incorporate the Surrey Lake Greenway, including a 4 meter wide multi-use path and landscape, partly within the road right-of-way and partly within a statutory right-of-way on private lands. This greenway will link with the existing Fleetwood Greenway and future Guildford Greenway on 156 Street, north at 80 Avenue.

76 Avenue

Currently, 76 Avenue is an unopened road allowance, south of the IAP. In the future, it could provide the IAP with improved connectivity, when traffic volumes warrant its opening.

77 Avenue

77 Avenue is proposed to provide an east-west connection through the center of the IAP. This special local road will distribute traffic throughout the neighbourhood and will provide a 15 metre wide habitat corridor with a greenway trail, located between the one-way travel lanes of the road. This unique

design will allow for a wildlife corridor through the IAP and trails connecting across the neighbourhood into Fleetwood Park and to greenways linkages. The habitat corridor will be provided through parkland dedication.

77 Avenue will connect to 152 Street via a 76 Avenue right-of-way, when Eaglequest (Coyote Creek) Gold Course redevelops. The alignment and timing of this connection is dependent on the redevelopment Golf Course, thus the alignment may not be exactly as shown in **Figure 5**. The connection to 152 Street will minimize traffic impacts on local roads in the IAP, such as 155 Avenue.

154 Street and 157 Street

154 Street and 157 Street are proposed green streets, located on the edges of the IAP to the west and east, respectively. Both roads are special local roads with housing on one side of the road and parkland on the other side of the road. This creates a public interface along the parkland, while maximizing opportunities for tree protection and ecosystem health. These roads will have sidewalks and street trees on the housing side of the road, whereas the parkland side will have trails.

Table 1 provides a list of the proposed roads in the Fleetwood Enclave IAP and their road classifications.

Road Name	Road Classification	Dedication Width (m)	Notes
155 Street	City Standard Local	20	Parking and sidewalk both sides
154A Street	City Standard Local	20	Parking and sidewalk both sides
155A Street	City Standard Local	20	Parking and sidewalk both sides
156A Street	City Standard Local	20	Parking and sidewalk both sides
78 Avenue	City Standard Local	20	Parking and sidewalk both sides
76A Avenue	Local Neo-Traditional	18	Parking and sidewalk both sides
76B Avenue	City Standard Local	20	Parking and sidewalk both sides
77B Avenue	City Standard Local	20	Parking and sidewalk both sides
78 Avenue	City Standard Local	20	Parking and sidewalk both sides
156 Street	City Standard Collector	24	Greenway (4m) with right-of-way
154 Street	Special Local Neo-Traditional Green	15.5	Sidewalk and parking on one side
157 Street	Special Local Neo-Traditional Green	15.5	Sidewalk and parking on one side
77 Avenue	Divided Special Local Habitat Corridor (15m) in the center	35.0	Sidewalk and parking on one side

Table 1 – Proposed Road Classifications

Road Cross Sections

Road cross sections for the proposed collector road (156 Street), the green local roads (154 Street and 157 Street), and the divided local road with a habitat corridor (77 Avenue) are provided in **Appendix II**.

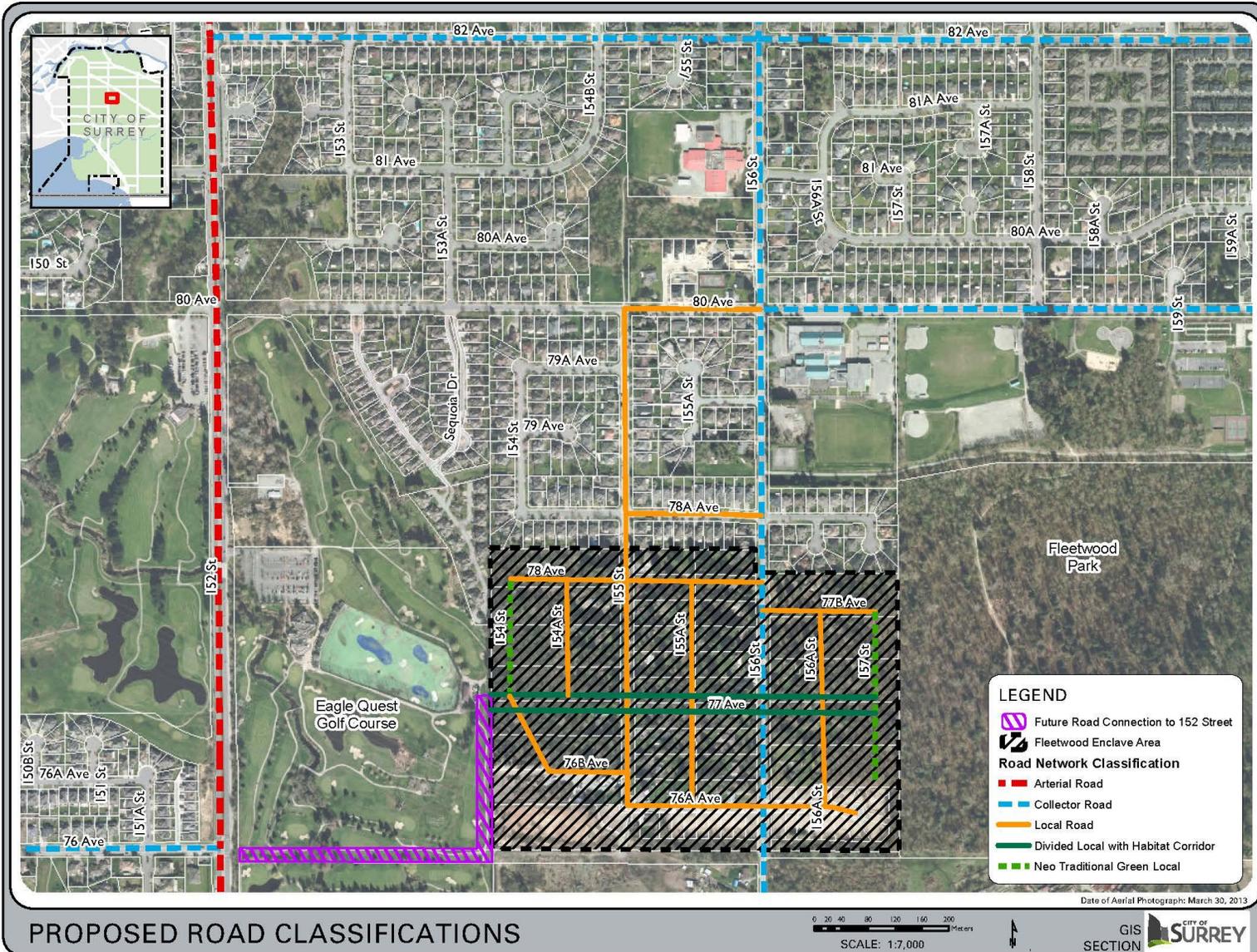


Figure 6 – Proposed Road Classifications

WALKING AND CYCLING NETWORK PLAN

The network of planned greenways, pathways, and the public road system will support effective circulation routes for walking and cycling within the community and to/from adjacent communities. The habitat corridor trail system, incorporated with 77 Avenue, will provide an east-west pedestrian connection throughout the IAP. The habitat corridor will connect to future greenway linkages on 156 Street and to the west and east of the IAP.

All of the local roads in the IAP will include sidewalks on one or both sides of the street, as shown in Figure 7. Local roads also provide a shared roadway for cyclists.



Figure 7 – Pedestrian Network Plan

TRANSIT SERVICES AND FACILITY PLAN

The proximity of the IAP to rapid and regular transit service and facilities is limited. The land uses and population densities planned for the IAP reflect this with low-medium density single family residential land uses. There are no plans to install transit stops or to provide transit service within the IAP. The nearest transit stops with regular bus service are located along 152 Street, at 76 Avenue and 80 Avenue. The future road connection to 152 Street via 77 Avenue will provide a more convenient pedestrian connection to bus stops at 152 Street.

2.3. Traffic Impact Assessment

The Traffic Impact Assessment (TIA) identifies the road and traffic control improvements that are required to support future traffic conditions, with the development of the Fleetwood Enclave IAP.

A copy of the TIA report is provided in **Appendix III**.

STUDY AREA

The analysis of traffic conditions is based on a study area, surrounding the Fleetwood Enclave IAP, as shown in **Figure 8**. The study area is bounded by 84 Avenue to the north, 76 Avenue to the south, 152 Street to the west, and 160 Street to the East. A total of 15 intersections are included in the study area.

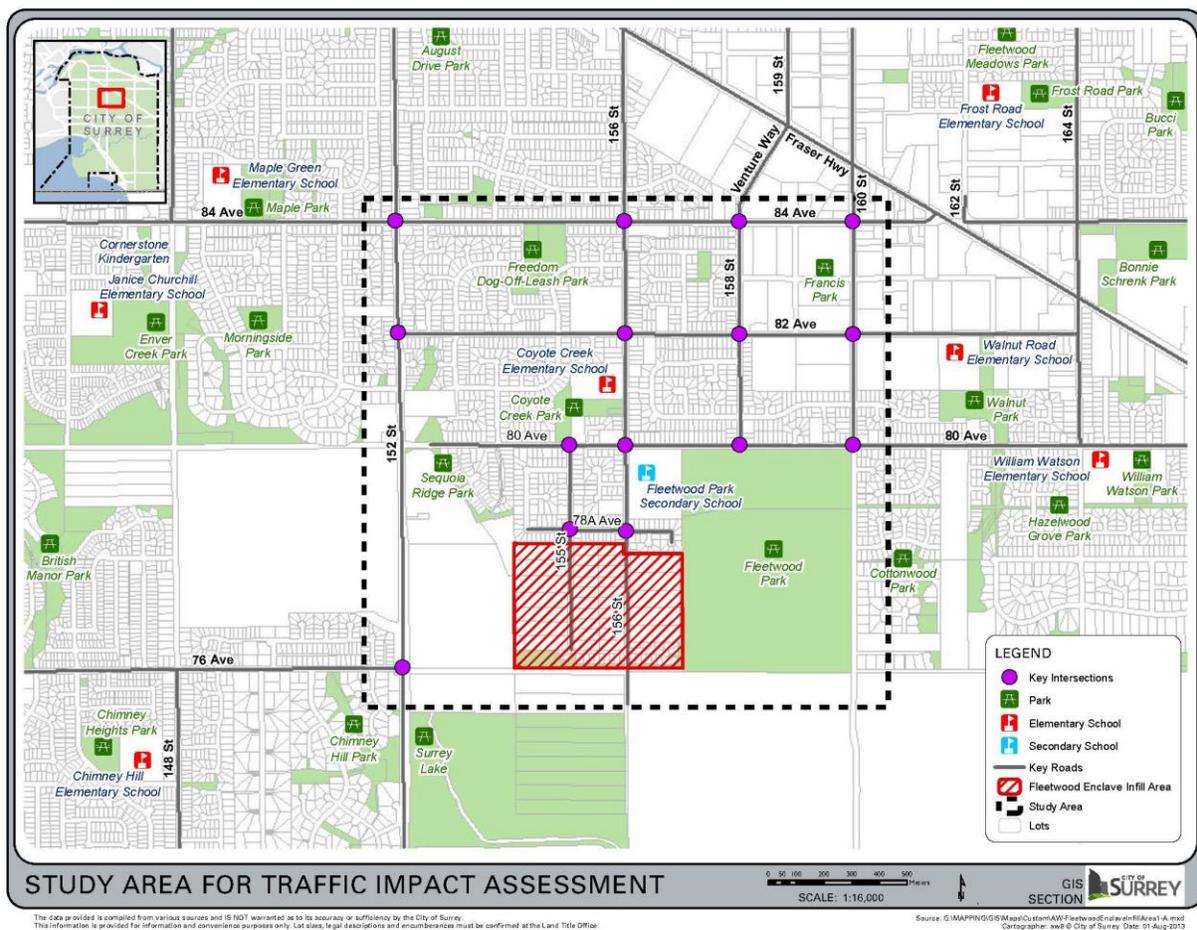


Figure 8 – Traffic Impact Assessment Study Area

ROAD CLASSIFICATIONS

The City of Surrey defines roads based on a classification system as follows:

- Arterial roads generally function to carry through traffic from one area to another with as little interference as possible from adjacent land uses. In some cases, arterial roads may provide direct access to adjacent properties as a secondary function, although this is generally not desirable.
- Collector roads primarily function to distribute traffic between arterial roads, other collector roads, and local roads within an area. Collector roads may also provide access to adjacent properties as required.
- Local roads are generally low volume neighbourhood streets that provide access to individual properties.

As shown in **Figure 9**, there are two arterial roads within the study area: 152 Street and 84 Avenue. 152 Street is a 4-lane arterial road with additional left-turn lanes at intersections. Parking is not allowed on either side of 152 Street. 84 Avenue is a 2-lane arterial road with left-turn lanes at major intersections. Parking is permitted on both sides of 84 Avenue.

156 Street, 158 Street, and 160 Street (south of 84 Avenue) are 2-lane collector roads with additional left-turn lanes at major intersections. Parking is permitted on both sides of 158 Street and the east sides of 156 Street and 160 Street. 82 Avenue is also a 2-lane collector road with parking on both sides of the street.

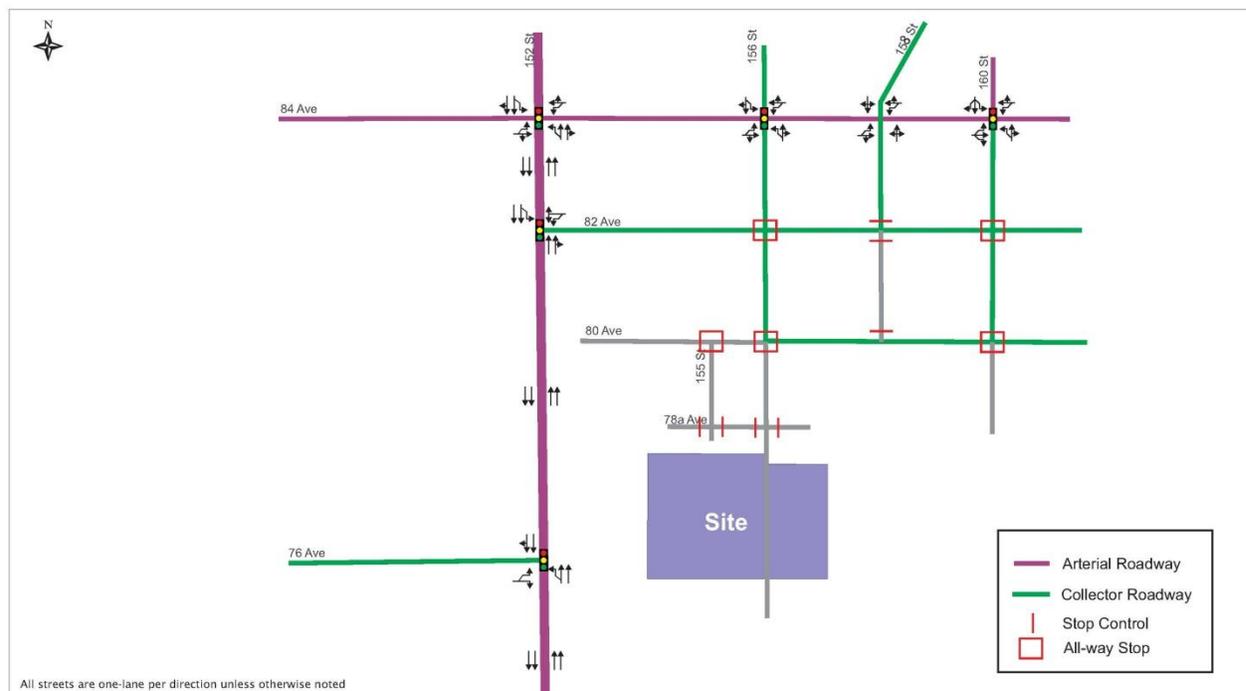


Figure 9 – Road Classifications and Traffic Controls in the Study Area

The traffic signals at 152 Street/82 Avenue and 152 Street/84 Avenue are coordinated in the north-south direction with a cycle length of 100 seconds. The posted speed limit is 60 km/h on 152 Street. On 84 Avenue, 156 Street, 158 Street, 160 Street and 82 Avenue, the posted speed limit is 50 km/h.

PERFORMANCE CRITERIA

The City has the following desired performance criteria for intersections:

- Level of Service (LOS) of a grade D or better;
- Volume-to-Capacity ratio (V/C) of 0.85 or less; and
- Total delay, equal to or less than, 35 seconds for non-signalized intersections.

LOS grades for intersections can range from an A grade to an F grade. The traffic conditions and average vehicle delays associated with the LOS grades, are summarized in **Table 2**.

LOS	Signalize Intersections		Non-signalized Intersections	
	Traffic Conditions	Average Vehicle Delay	Traffic Conditions	Average Vehicle Delay
A	Very few vehicles stopping	< 10 sec	Little or no delays	< 10 sec
B	Some vehicles must stop	10-20 sec	Short traffic delays	10-20 sec
C	Significant proportion of vehicles must stop	20-35 sec	Average traffic delays	20-30 sec
D	Many vehicles stopped	35-55 sec	Long traffic delays	30-40 sec
E	Frequent individual cycle failures	55-80 sec	Very long traffic delays	40-60 sec
F	Oversaturation of intersection	> 80 sec	Unacceptable delays	> 60 sec

Table 2 – Level of Service at Signalized and Non-signalized Intersections

CURRENT TRAFFIC CONDITIONS

The analysis of current traffic conditions in the study area are based on a Synchro 8 traffic model, using traffic count and signal timing data from the City. Of the 15 intersections in the study area, there are five (5) that do not meet the City’s performance criteria; they are as follows:

- 152 Street / 82 Avenue (signalized)
- 152 Street / 84 Avenue (signalized)
- 152 Street / 76 Avenue (signalized)
- 156 Street / 82 Avenue (non-signalized)
- 158 Street / 84 Avenue (non-signalized)

The intersections of 152 Street / 82 Avenue and 152 Street / 84 Avenue experience significant congestion, with V/C ratios of 0.85 and higher and LOS grades ranging from C to F. The intersection of 152 Street / 76 Avenue has a LOS grade of B, but a V/C ratio of 0.94 in the peak morning hour in the southbound direction.

156 Street / 82 Avenue and 158 Street / 84 Avenue are non-signalized intersections that experience unacceptable delays in the northbound direction in the peak morning hour. They have LOS grades ranging from D to F.

FUTURE TRAFFIC CONDITIONS

At full build-out, the Fleetwood Enclave IAP is estimated to generate about 266 vehicles per hour (66 in, 200 out) during the AM peak hour. In the PM peak hour, the IAP is estimated to generate 358 vehicles per hour (225 in, 133 out).

Based on traffic forecasts, the development of the IAP will have limited additional impact on the transportation network performance. However, the growth of the IAP will further impact the current traffic problems in the study area. Improvement are required for the transportation network to meet to current and future traffic demands, including those from the development of the IAP.

2.4. Transportation Network Improvements

REQUIRED IMPROVEMENTS

Based on the traffic impact assessment in **Section 2.3**, the following improvements to the transportation network are required to support increasing traffic demands.

152 Street / 76 Avenue

- Change the existing eastbound right turn lane to a shared left turn and right turn lane.*
- Extend the signal cycle length to 90 seconds.*
- Modify the signal cycle to include a protected northbound left turn phase.*

152 Street / 82 Avenue

- Extend the signal cycle length to 120 seconds.*
- Widen 82 Avenue to accommodate a new westbound right turn lane, within the existing right-of-way.

152 Street / 84 Avenue

- Extend the signal cycle length to 120 seconds, to coordinate with 152 Street / 82 Avenue.*
- Widen 84 Avenue to accommodate westbound and eastbound through lanes on the approaches to 152 Street.
- Lengthen the westbound left turn storage lane from 40m to 75m to accommodate peak hour queuing.

* These improvements can be addressed in-house by the City or with contractor assistance for civil work. Funding would be from the City's Traffic Operations operating budget.

IMPROVEMENTS FOR CONSIDERATION

The following transportation network improvements should be considered as the Fleetwood Enclave IAP is developed and traffic volumes increase in the study area.

152 Street / 82 Avenue

- A separate northbound right turn lane on 152 Street to 82 Avenue would improve operations, but would have significant property impacts.

Future Connection to 152 Street

- A future connection to 152 Street from 77 Avenue will provide a connection from the Fleetwood Enclave IAP to 152 Street. The connection will generally travel south from 77 Avenue to a future 76 Avenue roadway, then west to 152 Street. This connection could potentially alleviate some of the operational issues at 152 Street / 82 Avenue and 152 Street / 84 Avenue. The alignment and timing of this connection will depend on the redevelopment of the Eaglequest (Coyote Creek) Golf Course.

84 Avenue

- The widening of 84 Avenue, between Fraser Highway and 140 Street, to a 4-lane ultimate arterial standard may improve traffic conditions along 82 Avenue and the future connection to 152 Street. This improvement would attract longer distance traffic to 84 Avenue and possibly reduce the westbound left turn and northbound right turn volumes at 82 Avenue / 152 Street.

The required improvements that cannot be addressed in-house by the City should be included in the next 10-Year Servicing Plan. The improvements for consideration should not be immediately included in the 10-Year Servicing, and should be reviewed with the growth and development of the Fleetwood Enclave IAP.

2.5. 10-Year Servicing Plan

The City's 10-Year Servicing Plan establishes a program of engineering infrastructure and services required to meet the needs identified in the Official Community Plan and Neighbourhood Concept Plans. Projects listed in the 10-Year Servicing Plan are recommended for implementation and budgeted for. However, there is no commitment to implement the projects, nor to the priority the projects given in the plan. The 10-Year Servicing is updated approximately every two (2) years.

CURRENT 10-YEAR SERVICING PLAN

There are four (4) projects planned in the current 10-Year (2012-2021) Servicing Plan that are located within the TIA study area. These projects are summarized in **Table 3**.

Project ID	Project Type	Project Location	Priority	Total Cost
12147	Ultimate Collector Widening	76 Ave: 148 St – 152 St	Short Term (1 – 3 Yrs)	\$969,000
7666	Non-arterial Intersection Improvement	Roundabout: 82 Ave / 156 St	Short Term (1 – 3 Yrs)	\$500,000
7667	Non-arterial Intersection Improvement	Roundabout: 82 Ave / 160 St	Short Term (1 – 3 Yrs)	\$500,000
11762	Traffic Signal	84 Ave / 158 St	Short Term (1 – 3 Yrs)	\$175,000

Table 3 – Projects Planned in the TIA Study Area from the 10-Year (2012-2021) Servicing Plan

76 Avenue

The City plans to widen 76 Avenue, between 148 Street and 152 Street, to a 2-lane ultimate collector standard. This will include sidewalks, bike lanes, and a treed boulevard on both sides of the road.

82 Avenue / 156 Street and 82 Avenue / 160 Street

The City plans to install roundabouts at the intersection of 82 Avenue / 156 Street and 82 Avenue / 160 Street. Roundabouts control traffic at intersections with one-way circulation around a central island. The roundabouts are expected to considerably improve traffic movement and the performance of the intersections.

84 Avenue / 158 Street

The City plans to install a traffic signal at the intersection of 84 Avenue / 158 Street. The new signal will reduce side street delays and traffic congestion on 158 Street.

FUTURE 10-YEAR SERVICING PLAN

The projects that should be included in the next 10-Year (2014-2023) Servicing Plan are listed in **Table 4**.

Project Type	Project Location	Description	Total Cost
Arterial Intersection Improvement	152 Street / 82 Avenue	Install a new westbound right turn lane within the existing right-of-way	\$150,000
Arterial Intersection Improvement	152 Street / 84 Avenue	Widen 84 Avenue to accommodate westbound and eastbound through lanes on the approaches to 152 Street	\$520,000
Arterial Intersection Improvement	152 Street / 84 Avenue	Lengthen the westbound left turn storage lane to 75m	\$16,000
New Major Collector	156 Street: 76A to 80 Avenue	Upgrade 156 Street to collector status	\$360,000

Table 4 – Transportation Projects for Next 10-Year (2014-2023) Servicing Plan

Projects, such as signal timing and minor civil works, can be done by the City under the Traffic Operations budget. The proposed transportation infrastructure within the IAP will be constructed by developers.

3. Sanitary Sewer

3.1. Existing Servicing

Properties in the Fleetwood Enclave IAP fronting 155 Street are not connected to the City's sanitary system and have private on-site septic systems. Properties in the IAP fronting 156 Street are connected to the City's sanitary system, with a 250 mm diameter sewer main on 156 Street.

A 675 mm diameter gravity sewer main, that traverses the south-west corner of the IAP, collects the flow from the existing sewer mains in the IAP.

3.2. Design Criteria and Analysis

DESIGN CRITERIA

The City's Engineering Design Criteria is used to establish the servicing criteria for the IAP. The key applicable design criteria are as follows:

- Average daily flow is 350 L/capita/day.
- Peaking factor is calculated using the Harmon Formula.
- Inflow and infiltration rate is 11,200 L/Ha/day.

For local gravity sewer systems with a flow rate of less than 40 L/s, the following criteria apply.

- Manning Coefficient (n) is 0.013 for all pipes
- Local sewer flow shall not exceed 50 % of internal pipe diameter.
- Terminal sections of sanitary sewer mains shall have a minimum pipe grade of 1.0%, where there are 6 or less service connections for single family residential properties.
- The pipe grade shall be 0.6% or greater, for a sanitary sewer main servicing the 7th to 12th service connection to a residential single family property; the pipe grade shall be 0.5% or greater for all other sanitary sewer mains.
- Pipe grades less than 0.5 % may be used if the flow velocity is greater or equal to 0.6 m/s at 70% of the Peak Dry Weather Flow (PDWF).
- Sewer main depth shall be between 2.0 m and 3.5 m from the finished ground surface to the pipe invert.
- Sewer main depth up to 4.5 m may be tolerated for short lengths (generally less than 40 m) provided there are no direct service connections.

Population estimates for the design flow calculation are based on the assumption that each single family dwelling unit has a secondary suite. The number of people per dwelling unit is 5.22, which is the sum of 3.4 people for a single family household and 1.82 people for a secondary suite.

The depth of the sewer mains and the lot grades should be designed to allow all homes to have in-ground basements that are serviced by gravity to the fronting street sewer mains. This applies to the properties on 156 Street, where the existing sewer main is located.

ANALYSIS

Analysis indicates that the existing 250 mm diameter sewer main on 156 Street and the existing 675 mm diameter gravity sewer have sufficient capacity for the proposed development of the IAP. Tie-ins to the 675 mm diameter sewer will require P-traps.

3.3. Proposed System

The proposed sanitary system for the IAP is shown in **Figure 10**. The IAP will require base size, 200 mm diameter, sewer mains on all proposed roads within the IAP. The new sewer mains will tie-in to the existing 250 mm diameter main on 156 Street or the existing 675 mm diameter main in the south-west corner of the IAP. There are no additional off-site sewer upgrades required.

The development along 76A Avenue will install 200 mm diameter sewer main to service the 24-lots in the development. This main will tie-in to the existing 675 mm diameter gravity sewer.

3.4. 10-Year Servicing Plan and Financing

CURRENT 10-YEAR SERVICING PLAN

10-Year (2012-2021) Servicing Plan does not identify any sanitary projects that fall within the Fleetwood Enclave IAP.

FINANCING

Analysis indicates that additional sanitary infrastructure improvements outside the Fleetwood Enclave IAP are not required to support the development of the IAP. The proposed sanitary infrastructure within the IAP will be the responsibility of property owners or developers within the IAP area.

There are no sanitary projects recommended for the next 10-Year (2014-2023) Servicing Plan.

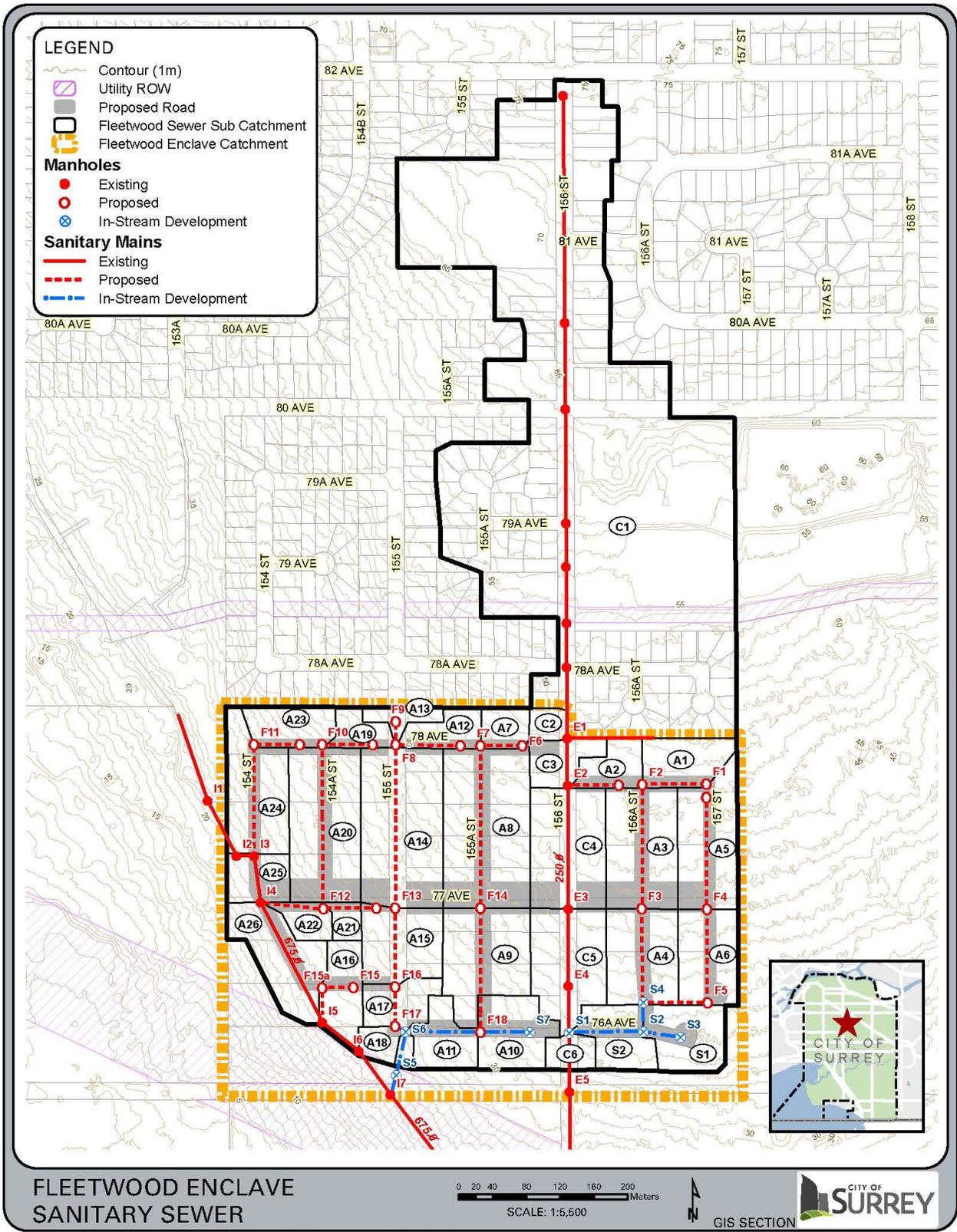


Figure 10 – Proposed Sanitary Sewer System

4. Water Services

4.1. Existing Servicing

Two existing 200 mm diameter distribution mains located along 155 Street and 156 Street provide water service to the existing properties in the Fleetwood Enclave IAP.

The water supply to the IAP travels from the Whalley Pump Station and through the 135 metre pressure zone, before entering the 90 metre pressure zone where the IAP is located. An existing pressure reducing valve (PRV) is located at the intersection of 155 Street and 80 Avenue, north of the IAP, at the boundary of the 135 metre to 90 metre pressure zone. A new PRV will be installed in 2013, on 156 Street near 79A Avenue, to provide redundancy for the water supply to the 90 metre pressure zone.

4.2. Design Criteria and Analysis

DESIGN CRITERIA

The City’s Engineering Design Criteria was used to calculate the water demands and water pressures for the IAP. The following design criteria were used:

- Maximum Day Demand is 1,000 L/capita/day
- Peak Hour Demand is 2,000 L/capita/day and approximately 27 L/s
- Design Flow is approximately 73 L/s
- Fire Flow is 60 L/s
- 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.

Population estimates for the design flow calculation are based on the assumption that each single family dwelling unit has a secondary suite. The number of people per dwelling unit is 5.22, which is the sum of 3.4 people for a single family household and 1.82 people for a secondary suite.

ANALYSIS

Analysis indicates that the existing 200 mm diameter distribution mains on 155 Street and 156 Street have sufficient capacity to meet the peak hour demand and fire flow requirement for the proposed development of the IAP.

4.3. Proposed System

The proposed water system for the IAP is shown in **Figure 11**. The IAP will require 200 mm diameter distribution mains on all proposed roads within the IAP. The new distribution mains will connect and extend to the existing 200 mm diameter mains on 155 Street and 156 Street. There are no additional off-site water upgrades required.

The development along 76A Avenue will install 200 mm diameter distribution mains to service the 24-lots in the development. This distribution main will connect to the new and existing distribution mains in the IAP.

4.4. 10-Year Servicing Plan and Financing

CURRENT 10-YEAR SERVICING PLAN

10-Year (2012-2021) Servicing Plan does not identify any water projects that fall within the Fleetwood Enclave IAP.

FINANCING

Analysis indicates that additional water infrastructure improvements outside the Fleetwood Enclave IAP are not required to support the development of the IAP. The proposed water infrastructure within the IAP will be the responsibility of property owners or developers within the IAP area.

There are no water projects recommended for the next 10-Year (2014-2023) Servicing Plan.

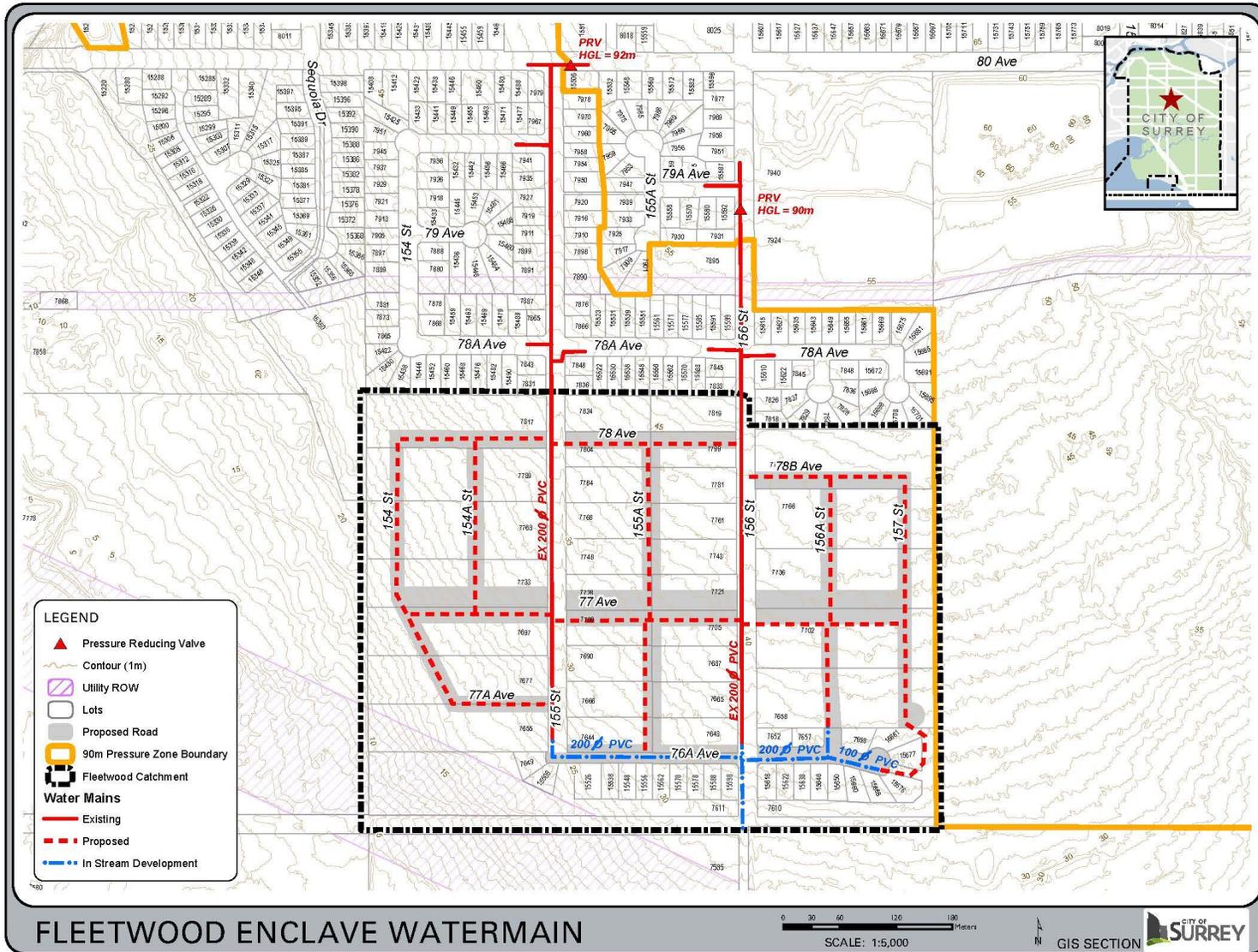


Figure 11 – Proposed Water Distribution System

5. Stormwater

This section of the report describes the existing stormwater system and the proposed system to service future development in the Fleetwood Enclave IAP. A copy of the stormwater study prepared for the IAP is provided in **Appendix IV**.

5.1. Existing Servicing

The Fleetwood Enclave IAP has three (3) stormwater sub-catchments, referred to as A, B and C. The sub-catchments and existing stormwater infrastructure is discussed below and shown in **Figure 12**.

SUB-CATCHMENT A

Sub-catchment A includes the land within the IAP from the Eaglequest (Coyote Creek) Golf to the west side of 155 Street. There is also a section of land at the south end of the IAP, between 155 Street and 156 Street, that falls within sub-catchment A.

There is no formal stormwater infrastructure in this sub-catchment. As a result, stormwater follows the topography that slopes to the south-west. Flows likely drain outside the IAP to a ditch in the unopened 76 Avenue right-of-way, then to Surrey Lake via open ditches and piped sections.

SUB-CATCHMENT B

Sub-catchment B includes the land between sub-catchment A to the west and sub-catchment C to the east. The lands in sub-catchment B are generally between 155 Street and the west side of 156 Street.

Sub-catchment B is serviced with grassed ditches and driveway culverts along 155 Street. The flows are directed to the south end of 155 Street to a 675 mm diameter storm pipe. The storm pipe conveys the flows, outside the IAP, to the ditch in the 76 Avenue right-of-way and ultimately to Surrey Lake. The ditches in this sub-catchment appear to be in good condition with no significant influx of vegetation and no evidence of erosion.

SUB-CATCHMENT C

Sub-catchment C includes the land between 156 Street to the west to Fleetwood Park to the east. This sub-catchment also includes land to the north of the IAP, extending up to 80 Avenue. This land outside the IAP drains through the IAP and contributes to the stormwater management required in this sub-catchment and the IAP.

Sub-catchment C is serviced by a storm sewer pipe system located on the east side of 156 Street. This pipe system directs flows to the south end of 156 Street, where it connects to a ditch outside the IAP and adjacent to the 156 Street right-of-way. The ditch drains to the 156 Street fish bearing watercourse, then to Bear Creek downstream of Surrey Lake. The ditch is armoured with rock and is well vegetated.

East of sub-catchment C there is land within the IAP that does not have a formal stormwater system. In this area, flows are conveyed overland to the ditch system within the 76 Avenue right-of-way and the 156 Street right-of-way.

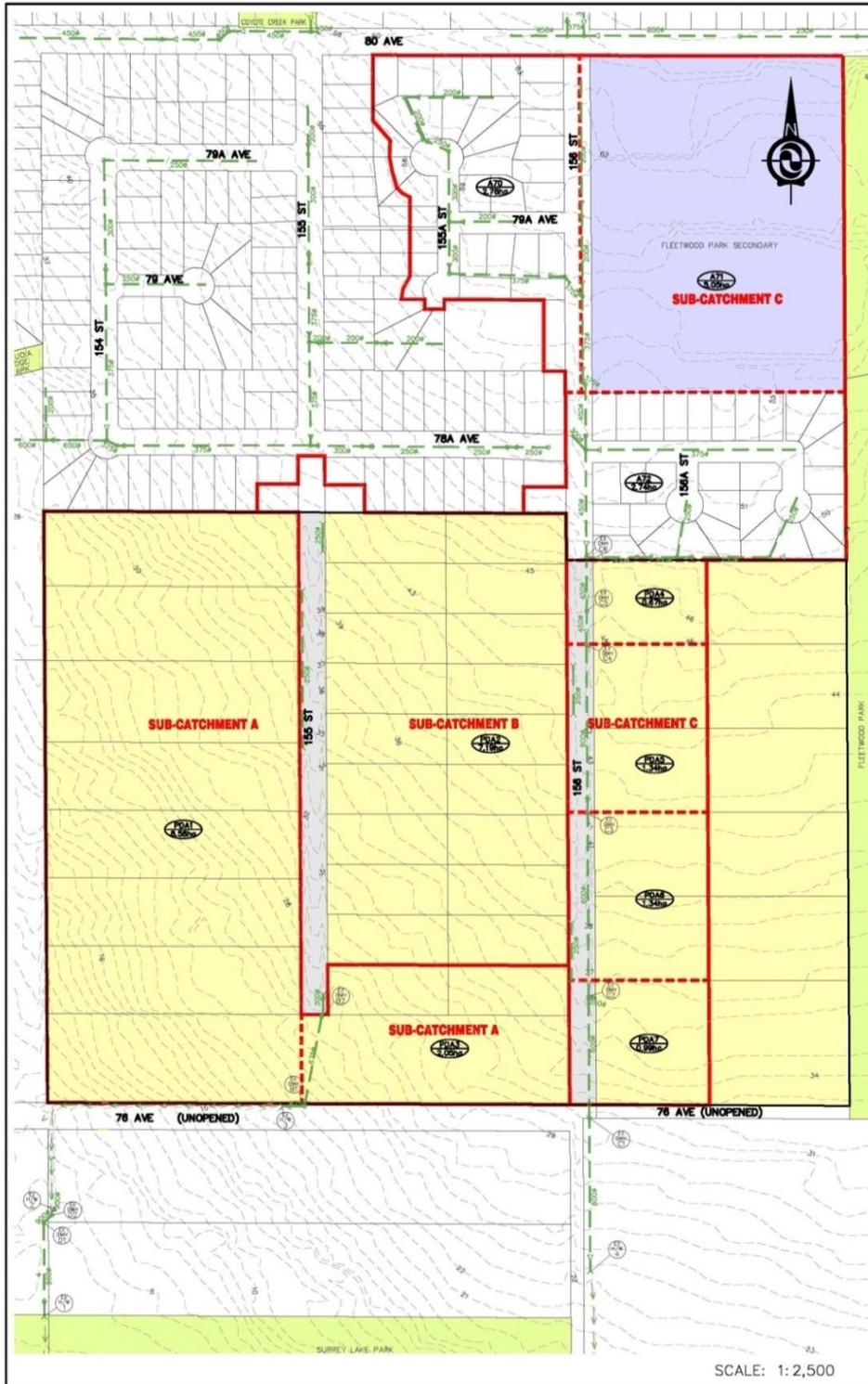


Figure 12 – Existing Stormwater Sub-Catchments and Infrastructure

5.2. Design Criteria and Analysis

Stormwater analyses were conducted for the existing and developed Fleetwood Enclave IAP conditions. The analyses were performed for the area within sub-catchments A, B and C, including the existing ditches south of the IAP.

DESIGN CRITERIA

The City's Engineering Design Criteria specifies criteria for stormwater systems, such as the Fleetwood Enclave IAP. The criteria for stormwater systems are as follows:

- Conveyance capacity up to the 5 year storm runoff within an unsurcharged pipe or ditch, and safe conveyance of the 100 year storm runoff.
- Control the 5 year post-development flow to 50 percent of the 2 year post-development flow, or control the 5 year post-development flow to the 5 year pre-development flow rate.

EXISTING CONDITIONS

The existing stormwater infrastructure adequately services for the 5 year storm event without ponding or surcharging. Surrey Lake, to the south of the IAP, which receives flows from sub-catchment A and B, can detain up to the 5 year storm event for the existing suburban zoning.

Sub-catchments A and B drain to the ditch at the south west corner of the IAP, within the 76 Avenue right-of-way. This ditch is shown to have sufficient capacity for 5 year and 100 year rainfall events. In sub-catchment C, the 450 mm diameter and 600 mm diameter storm sewers on 156 Street within the IAP have sufficient capacity for the 5 year rainfall event.

FUTURE CONDITIONS

After development, the Fleetwood Enclave IAP will have increased impervious areas for new homes and roads. As a result, there will be an increase in potential runoff volumes from the sub-catchments. Mitigation measures are required to address the increase in runoff volume. Storm sewers will be required in sub-catchment A along the proposed roads. In sub-catchment B, storm sewer will be required on the east and west side of 156 Street.

In sub-catchment C, the existing 450 mm diameter and 600 mm diameter storm sewers on 156 Street have sufficient capacity of the 5 year rainfall event. The existing storm sewer on 156 Street, south of 78A Avenue, may need to be lowered by the developer if new homes fronting 156 Street have basements. Further analysis will be required at the design stage.

The analysis of the downstream system confirms that the ditch in the 76 Avenue right-of-way has capacity for the 5 year and 100 year post-development rainfall events from sub-catchment A and B. The 76 Avenue right-of-way ditch is armoured with rip rap and gravel check dams. The pipe and ditch in the 156 Street right-of-way are adequate to convey the future stormwater flows from sub-catchment C.

5.3. Sustainability

As part of Best Management Practices and the City's Sustainability Charter, development must minimize potential impacts to the downstream lands. To mitigate the land use change of the Fleetwood Enclave IAP from Suburban to Urban, sustainability measures are required. The volume of runoff from the developed IAP should be comparable to existing runoff volumes.

A geotechnical analysis, included in the stormwater study in **Appendix IV**, found that stormwater infiltration will effectively mitigate the increase in runoff volume from the developed IAP. It is recommended in the stormwater study that on-site infiltration facilities be installed on all lots to reduce runoff and flows in the stormwater system and ultimately, the floodplain.

To mitigate the Plan area land use change from Suburban to Urban, and in keeping with the Official Community Plan (OCP), sustainability measures are required. In consultation with developers to meet the mitigation objectives, development in the Plan will provide 450 mm of absorbent topsoil on all landscaped areas for on-lot infiltration, and boulevard exfiltration for roads and City lands. On-site infiltration with topsoil has been successful in other NCPs, such as East Clayton and Morgan Heights. Developers are responsible for ensuring sustainability measures are carried out at the building stage.

5.4. Proposed System

The proposed stormwater system and sub-catchment boundaries for the Fleetwood Enclave IAP are illustrated in **Figure 13** and discussed below.

SUB-CATCHMENT A

Sustainability measures, storm sewers, and an outfall are required to service the land in sub-catchment A. The storm sewer will drain flows to a new outfall located south of 76B Avenue. The outfall will cross the Parkland and BC Hydro right-of-way before connecting to the existing ditch within the 76 Avenue right-of-way. A new right-of-way will be required through the Parkland and BC Hydro right-of-way to facilitate the installation and maintenance of the new storm sewer. Through the Parkland, the Parks Department has indicated a desire to preserve the existing vegetation. The final alignment of the outfall will require review and approval by a certified arborist.

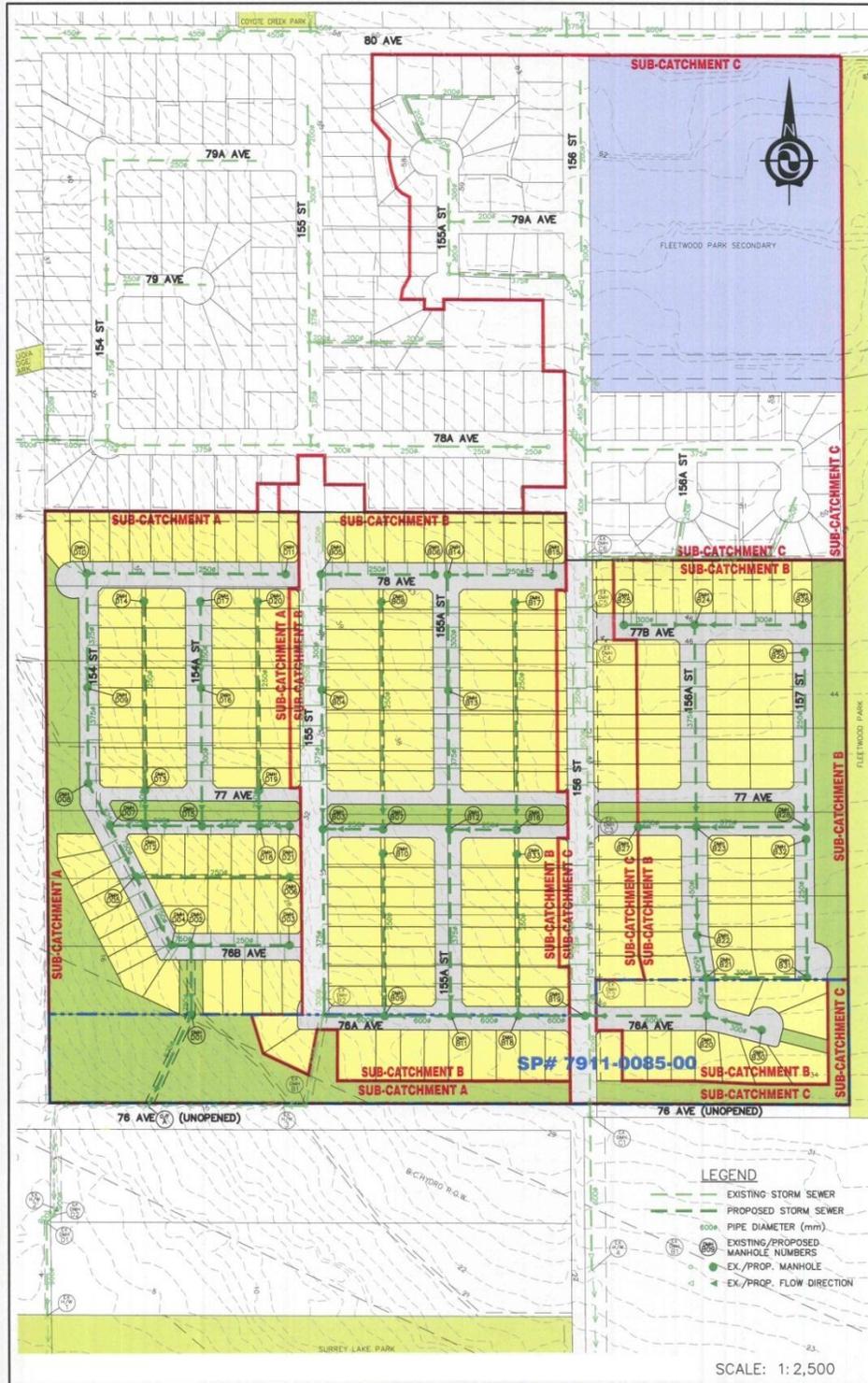


Figure 13 – Proposed Stormwater Sub-Catchments and Infrastructure

SUB-CATCHMENT B

The proposed system extends sub-catchment B to include the land within the IAP, between sub-catchment C and Fleetwood Park. Sustainability measures and storm sewers are required to service the land in sub-catchment B. Storm sewers are required along the roads in the sub-catchment, including 76A Avenue, 77 Avenue, 78 Avenue, 77B Avenue, 155 Street, 155A Street, 156A Street, and 157 Street. The storm sewers in this sub-catchment flow to the existing 675 mm diameter storm outfall at the south end of 155 Street. This outfall must be lowered to allow homes to have in-ground basements.

Due to topographic and land use constraints, servicing of the 157 Street cul-de-sac, south of 77 Avenue, will require a utility corridor from 157 Street to 156A Street. The corridor layout will likely require a dedication and approval from Planning and Engineering. This corridor can also be used for sanitary and water utilities.

SUB-CATCHMENT C

Sub-catchment C includes areas outside the IAP and the land within the IAP that can be serviced by the existing storm sewer along 156 Street. Sustainability measures and the existing 600 mm diameter storm sewer are adequate to service the proposed development within the IAP. The 600 mm storm sewer may need to be lowered by the developers if in-ground basements are desired for new homes fronting 156 Street.

5.5. 10-Year Servicing Plan and Financing

CURRENT 10-YEAR SERVICING PLAN

10-Year (2012-2021) Servicing Plan does not identify any stormwater projects that fall within the Fleetwood Enclave IAP.

FUTURE 10-YEAR SERVING PLAN & FINANCING

Analysis indicates that additional stormwater infrastructure improvements outside the Fleetwood Enclave IAP are not required to support the development of the IAP. The proposed stormwater infrastructure, including mitigation measures, within the IAP will be the responsibility of developers. Through the use of sustainability measures, the downstream system will not require upgrades, except as noted in **Section 5.4**.

There are no stormwater projects recommended for the next 10-Year (2014-2023) Servicing Plan.

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City of Surrey

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Surrey School Board

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Consultants

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Jane Farquharson	Bunt and Associates Engineering Ltd.
Richard Brooks	HY Engineering Ltd.

Appendix II – Road Cross Sections for the Fleetwood Enclave Infill Area Plan





Fleetwood Enclave
Infill Area

156 Street Collector with Greenway

Cross Section
AA

Typical 24 m Collector with 2.7 m Statutory right of way along eastern property line with a 4.0 m Greenway



Fleetwood Enclave
Infill Area

154 Street Neo-Traditional Local

Cross Section
CC

15.5 m Green Local with front loaded lots along eastern edge and Linear Park Expansion along Golf Course Lands.
On street Parking on residential side only.



Fleetwood Enclave
Infill Area

157 Street Neo-Traditional Local

Cross Section
BB

15.5 m Green Local with front loaded lots along western edge and Fleetwood Park Expansion along Eastern Edge.
On street Parking on residential side only.

Appendix III – Fleetwood Enclave Transportation Impact Assessment by Bunt & Associates, October 2012

A copy of this report is available in the Engineering Department.

Appendix IV – Southwest Fleetwood Enclave Drainage Study by H.Y. Engineering Ltd., January 2013

A copy of this report is available in the Engineering Department.