

NO: **R161**

COUNCIL DATE: **September 9, 2013**

REGULAR COUNCIL

TO: **Mayor & Council**

DATE: **September 5, 2013**

FROM: **General Manager, Engineering**

FILE: **6520-20 (Fleetwood Enclave)**

SUBJECT: **Engineering Servicing Strategy and Related Financial Strategy for the Fleetwood Enclave Neighbourhood Concept Plan**

RECOMMENDATION

The Engineering Department recommends that Council:

1. Receive this report for information;
2. Approve the engineering servicing strategy and the related financial strategy as generally described in this report and as documented in the Appendices attached to this report related to the Infill Area Concept Plan for the Fleetwood Enclave Neighbourhood, all for the purpose of managing the provision of engineering services in support of development in this Area; and
3. Authorize staff to include in the Engineering Department's 10-Year (2012-2021) Servicing Plan the Development Cost Charge (DCC)-eligible transportation infrastructure services as documented in Appendix VII attached to this report.

INTENT

The purpose of this report is to provide an overview of the engineering servicing strategy and related financial strategy in support of development in the Infill Area Concept Plan for the Fleetwood Enclave Neighbourhood.

BACKGROUND

Council approved the Fleetwood Enclave Infill Area Concept Plan at its Regular meeting on March 11, 2013 (R049; 2013). Since that time, specific strategies for the provision of roads, water, sewer and drainage (i.e., a servicing strategy) have been developed for the Area.

DISCUSSION

A copy of the Fleetwood Enclave Area Servicing Strategy is attached as Appendix I to this report. The following sections of this report provide a brief synopsis of the strategy for each of the engineering services covered by the Strategy.

Water

The Plan Area is located within the servicing area of the Whalley Pump Station and is serviced by water distribution mains on 155 Street and 156 Street. The Whalley Pump Station and the existing distribution mains have sufficient capacity to meet the peak hour demand and fire flow requirements at build out of development in the Plan Area. As the Plan Area is developed, water mains will need to be extended to service new homes in the area. These mains will follow the local road network in the Area. A map that illustrates the proposed water main network in the Area is attached to this report as Appendix II.

No off-site water system improvements are necessary to service development in the Plan Area.

Sanitary Sewer

Properties fronting 156 Street in the Plan Area are connected to the City's sanitary sewer system, which has sufficient capacity to receive flows generated by the build out of development in the Plan Area. The properties fronting 155 Street in the Plan area are not currently connected to the City's sanitary sewer system but rather are currently serviced with private on-site septic systems. These properties when they are developed will be serviced by local sewers that will follow the local road network and that will connect to the existing sanitary sewer system within the Plan Area. A map that illustrates the proposed sanitary sewer network in the Plan Area is attached to this report as Appendix III.

No off-site sanitary sewer system improvements are necessary to service development in the Plan Area.

Stormwater

The Plan Area has three (3) stormwater catchment areas as illustrated in Appendix IV. There is no existing stormwater infrastructure in Catchment Area A. Catchment Area B is serviced with existing road-side grass ditches, and Catchment Area C is serviced by a storm sewer on 156 Street. Each of the catchment areas drains to the south to outfalls and ditches that ultimately convey flows downstream to Bear Creek or Surrey Lake to the south.

Local storm sewers will need to be constructed in each of these Catchment Areas that will follow the local road network and connect to the existing stormwater system within the Plan area.

A map that illustrates the proposed stormwater network is attached to this report as Appendix IV.

No off-site stormwater system improvements are necessary to service development in the Plan Area.

The existing storm sewer on 156 Street, south of 78A Avenue, has sufficient capacity to service planned future demands but may need to be lowered if new homes fronting 156 Street in this section are to have in-ground basements.

In alignment with the Sustainability objectives of the City's Sustainability Charter and the Official Community Plan (OCP) stormwater management-related sustainability measures will be required in new development in the Plan Area. Development in Plan Area will be required to provide 450 mm of absorbent topsoil on all landscaped areas for on-lot infiltration and on boulevards to allow for stormwater exfiltration along roads and on City lands such as parks and greenways.

Such infiltration measures have been successful in other NCPs, such as East Clayton and Morgan Heights.

Impacts on the Serpentine and Nicomekl Lowlands Flood Control Project

With the above-described on-site mitigation measures in place, stormwater generated by development in the Plan Area will not negatively impact the City's lowlands. This is in compliance with the Serpentine and Nicomekl Lowlands Flood Control Project that includes flood control standards based on the Agri-Food Regional Development Subsidiary Agreement (ARDSA) criteria.

Transportation

The proposed transportation infrastructure for the Plan Area includes a grid road system that takes into account efficient development of properties, environmental protection, and greenway connections. The transportation network for the Plan Area is based on the guiding principles contained in the City's Transportation Strategic Plan as listed below:

- Effective and efficient management of the road network;
- Travel choices;
- Safe, healthy communities;
- Successful local economies;
- Protection of the built and natural environments; and
- Transportation integration.

A map that illustrates the proposed road network to service build out of the Plan Area is attached to this report as Appendix V.

Walking & Cycling

The proposed road network provides for walking and cycling throughout the Area. Roads with unique cross sections are planned for adjacent to Fleetwood Park and the Eaglequest (Coyote Creek) Golf Course. All other roads in the Area are designed to provide sidewalks on both sides, separated from traffic by boulevards that will accommodate street trees. The walking and cycling network in the Plan area will be complemented by the continuation of Surrey Lake Greenway on 156 Street, which connects to both the Fleetwood Greenway and the southern end of the Guildford Greenway. All of the local roads will be bike-friendly. The 156 Street collector road will have on-street bicycle lanes. The network of pathways and the infrastructure within the public road system will provide good routes for walking and cycling within the Plan Area and to and from adjacent communities.

A map that illustrates the proposed walking and cycling plan for the Plan Area is attached to this report as Appendix VI.

Transit

While at this time there are no plans to bring transit service into the Plan Area, 156 Street and the possible future 76 Avenue will be designed to accommodate transit service. Development in the Plan Area will have walking access to the transit services provided on 152 Street through Surrey Lake Park.

General Purpose Traffic / Vehicles

The road network for the Plan Area is designed to provide route options and circulation for all modes within the Plan area. It will distribute traffic volumes relatively evenly across the streets in the neighbourhood to minimize potential traffic impacts on any particular street.

On-street parking will be provided for on both sides of most of the streets within the Plan Area. Unique cross sections have been developed for the streets adjacent to Fleetwood Park and to complement the planned wildlife corridor along 77 Avenue.

Integration with Adjacent Transportation Networks

The Plan Area currently has limited transportation access and connectivity with the neighbouring communities. It is bordered by the Eaglequest Golf Course to the west, Fleetwood Park to the east and agricultural land to the south. Access to development in the Plan Area will be by way of 156 Street, which connects with 82 and 84 Avenues further to the north. In the future an extension of 76 Avenue from the Plan Area to 152 Street has been identified should redevelopment of the golf course occur.

Off-Site Transportation Improvements

A traffic analysis was completed to determine the impact to the external road network related to build out of development in the Plan Area. The study concluded that network improvements were attributable to broader background traffic growth and not development in the Plan Area.

In 2014 roundabouts are expected to be constructed at the intersection of 82 Avenue and 156 Street and at the intersection of 82 Avenue and 160 Street. These would be constructed regardless of the level of development in the Plan Area.

Financial Analysis

A comprehensive financial analysis was completed in support of the above-described engineering servicing strategy. The following table provides a summary of the Development Cost Charge (DCC) revenues that are expected to be generated from development in the Plan Area and the construction costs for the infrastructure projects that are necessary to service build out development in the Plan Area.

Services	Estimated DCC Revenues	DCC-Eligible Costs Attributable to the Plan Area	DCC Revenues Available to Projects Outside the Plan Area
Stormwater	\$950,000	\$0	\$950,000
Water	\$450,000	\$0	\$450,000
Sanitary Sewer	\$590,000	\$0	\$590,000
Non-arterial roads	\$610,000	\$360,000	\$250,000
Arterial Roads	\$2,800,000	\$686,000	\$2,114,000

The estimated DCC revenues are based on the DCC rates that came into effect on March 15, 2013, and include the related DCC municipal assist factor for each utility.

Appendix VII attached to this report lists the transportation infrastructure projects within this NCP that are eligible to be included in the 10-Year Servicing Plan and their DCC-eligible cost component. As the DCC revenues expected to be collected from development within the Plan Area can support the funding of these projects, it is recommended that these projects as listed in Appendix VII be included in the 10-Year (2012-2021) Servicing Plan.

CONCLUSION

The engineering infrastructure as described in this report will support the build-out of development proposed in the Plan Area. The financial strategy as proposed is consistent with the “development-pay” principle, which requires each Neighbourhood Concept Plan to be financially self-sufficient.

Based on the above discussion, the Engineering Department recommends that Council:

- Approve the engineering servicing strategy and the related financial strategy as generally described in this report and as documented in the Appendices attached to this report related to the Infill Area Concept Plan for the Fleetwood Enclave Neighbourhood, all for the purpose of managing the provision of engineering services in support of development in this Area; and
- Authorize staff to include in the Engineering Department’s 10-Year (2012-2021) Servicing Plan the Development Cost Charge (DCC)-eligible transportation infrastructure services as documented in Appendix VII attached to this report.

Vincent Lalonde, P.Eng.
General Manager, Engineering

LCH/JA/brb

Appendix I - Servicing Strategy
Appendix II - Map of Proposed Water Network
Appendix III - Map of Proposed Sanitary Sewer Network
Appendix IV - Map of Proposed Stormwater Network
Appendix V - Map of Proposed Road Network
Appendix VI - Map of Proposed Walking and Cycling Network
Appendix VII- 10 Year Servicing Plan Projects

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:

The City of Surrey does not warrant the accuracy or completeness of the information contained in this document or any use of this document by the user. The information contained in this document is relevant only to the date of first printing and may not incorporate subsequent amendments. It is the responsibility of the user of this document to contact the Planning and Development Department regarding any amendments pertaining to this document.

ENGINEERING SERVICING STRATEGY

Table of Contents

1. General Servicing.....	5
1.1. Servicing Principles and Guidelines.....	5
2. Transportation	7
2.1. Current Transportation Network	7
2.2. Proposed Transportation Network	9
2.3. Traffic Impact Assessment	14
2.4. Transportation Network Improvements.....	17
2.5. 10-Year Servicing Plan.....	19
3. Sanitary Sewer	21
3.1. Existing Servicing.....	21
3.2. Design Criteria and Analysis.....	21
3.3. Proposed System	22
3.4. 10-Year Servicing Plan and Financing	22
4. Water Services	24
4.1. Existing Servicing.....	24
4.2. Design Criteria and Analysis.....	24
4.3. Proposed System	24
4.4. 10-Year Servicing Plan and Financing	25
5. Stormwater	27
5.1. Existing Servicing.....	27
5.2. Design Criteria and Analysis.....	29
5.3. Sustainability.....	30
5.4. Proposed System	30
5.5. 10-Year Servicing Plan and Financing	32

List of Figures

FIGURE 1 – FLEETWOOD ENCLAVE LAND USE CONCEPT PLAN6
 FIGURE 2 – CURRENT ROAD NETWORK.....7
 FIGURE 3 – CURRENT TRANSIT SERVICE MAP.....8
 FIGURE 4 – CURRENT SIDEWALK NETWORK.....9
 FIGURE 5 – PROPOSED ROAD NETWORK.....10
 FIGURE 6 – PROPOSED ROAD CLASSIFICATIONS12
 FIGURE 7 – PEDESTRIAN NETWORK PLAN.....13
 FIGURE 8 – TRAFFIC IMPACT ASSESSMENT STUDY AREA.....14
 FIGURE 9 – ROAD CLASSIFICATIONS AND TRAFFIC CONTROLS IN THE STUDY AREA.....15
 FIGURE 10 – PROPOSED SANITARY SEWER SYSTEM.....23
 FIGURE 11 – PROPOSED WATER DISTRIBUTION SYSTEM26
 FIGURE 12 – EXISTING STORMWATER SUB-CATCHMENTS AND INFRASTRUCTURE.....28
 FIGURE 13 – PROPOSED STORMWATER SUB-CATCHMENTS AND INFRASTRUCTURE.....31

List of Tables

TABLE 1 – PROPOSED ROAD CLASSIFICATIONS.....11
 TABLE 2 – LEVEL OF SERVICE AT SIGNALIZED AND NON-SIGNALIZED INTERSECTIONS16
 TABLE 3 – PROJECTS PLANNED IN THE TIA STUDY AREA FROM THE 10-YEAR (2012-2021) SERVICING PLAN.....19
 TABLE 4 – TRANSPORTATION PROJECTS FOR NEXT 10-YEAR (2014-2023) SERVICING PLAN.....20

List of Appendices

APPENDIX I – ACKNOWLEDGEMENTS
 APPENDIX II – ROAD CROSS SECTIONS FOR THE FLEETWOOD ENCLAVE INFILL AREA PLAN
APPENDIX III – FLEETWOOD ENCLAVE TRANSPORTATION IMPACT ASSESSMENT BY BUNT & ASSOCIATES, OCTOBER 2012
 APPENDIX IV – SOUTHWEST FLEETWOOD ENCLAVE DRAINAGE STUDY BY H.Y. ENGINEERING LTD., JANUARY 2013

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.

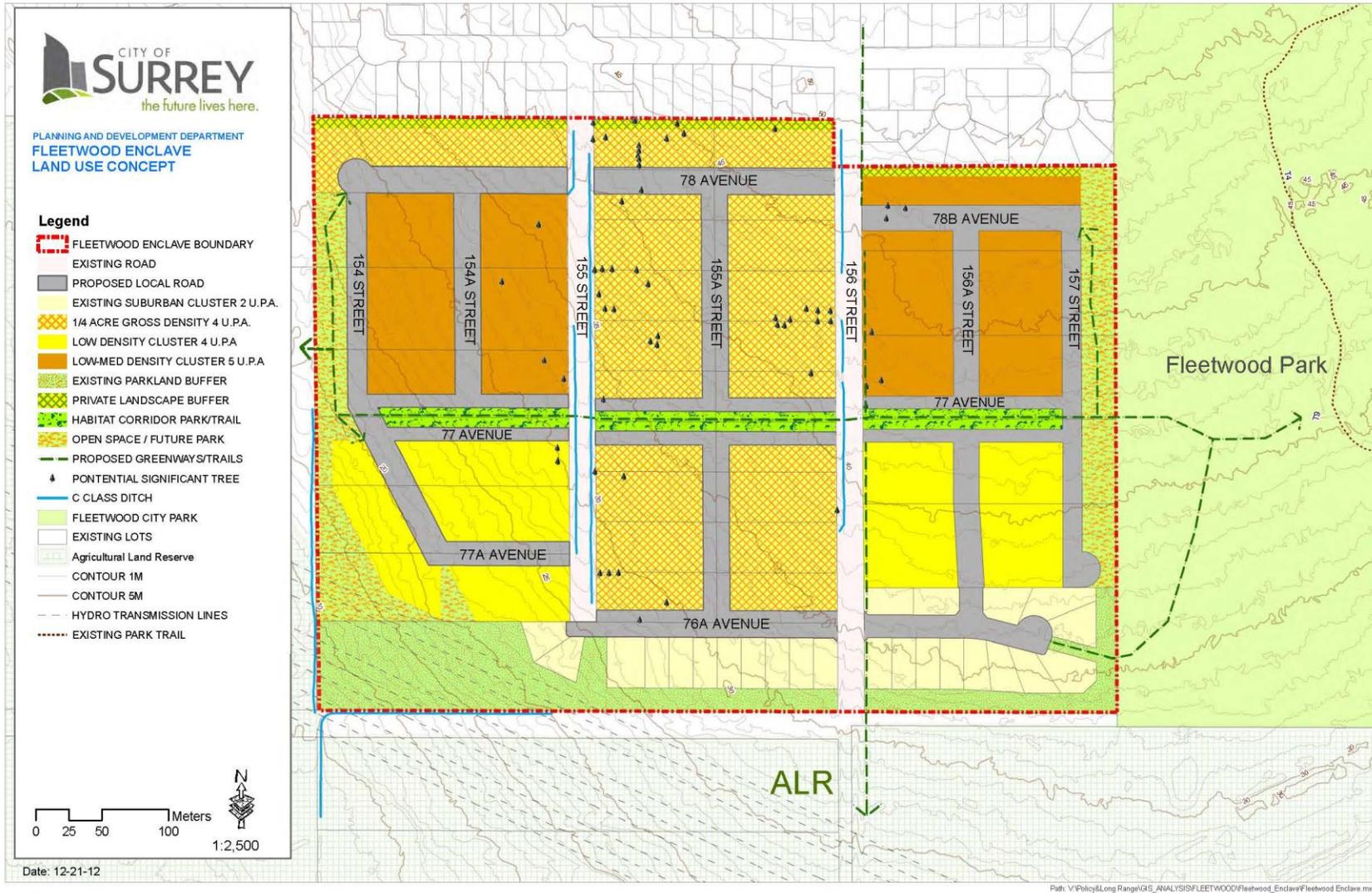


Figure 1 – Fleetwood Enclave Land Use Concept Plan

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.

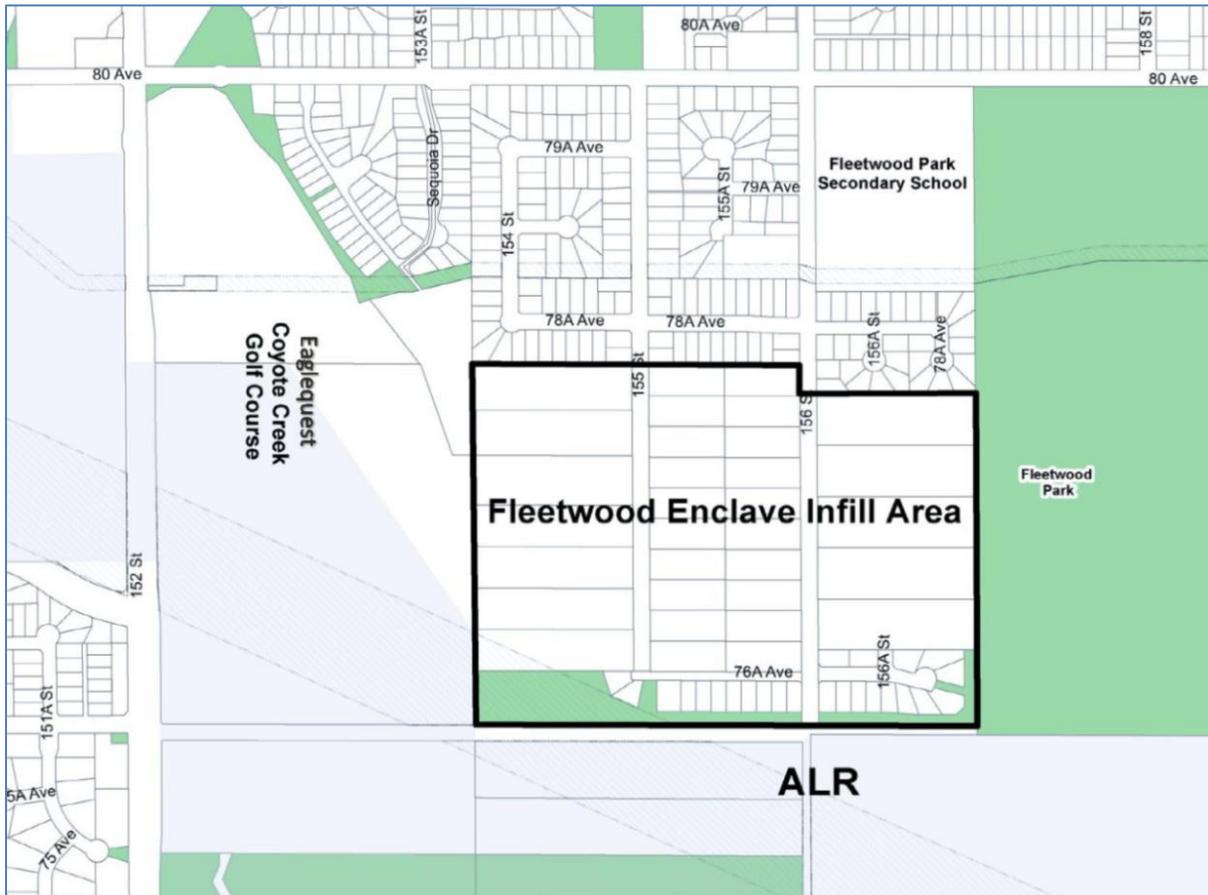
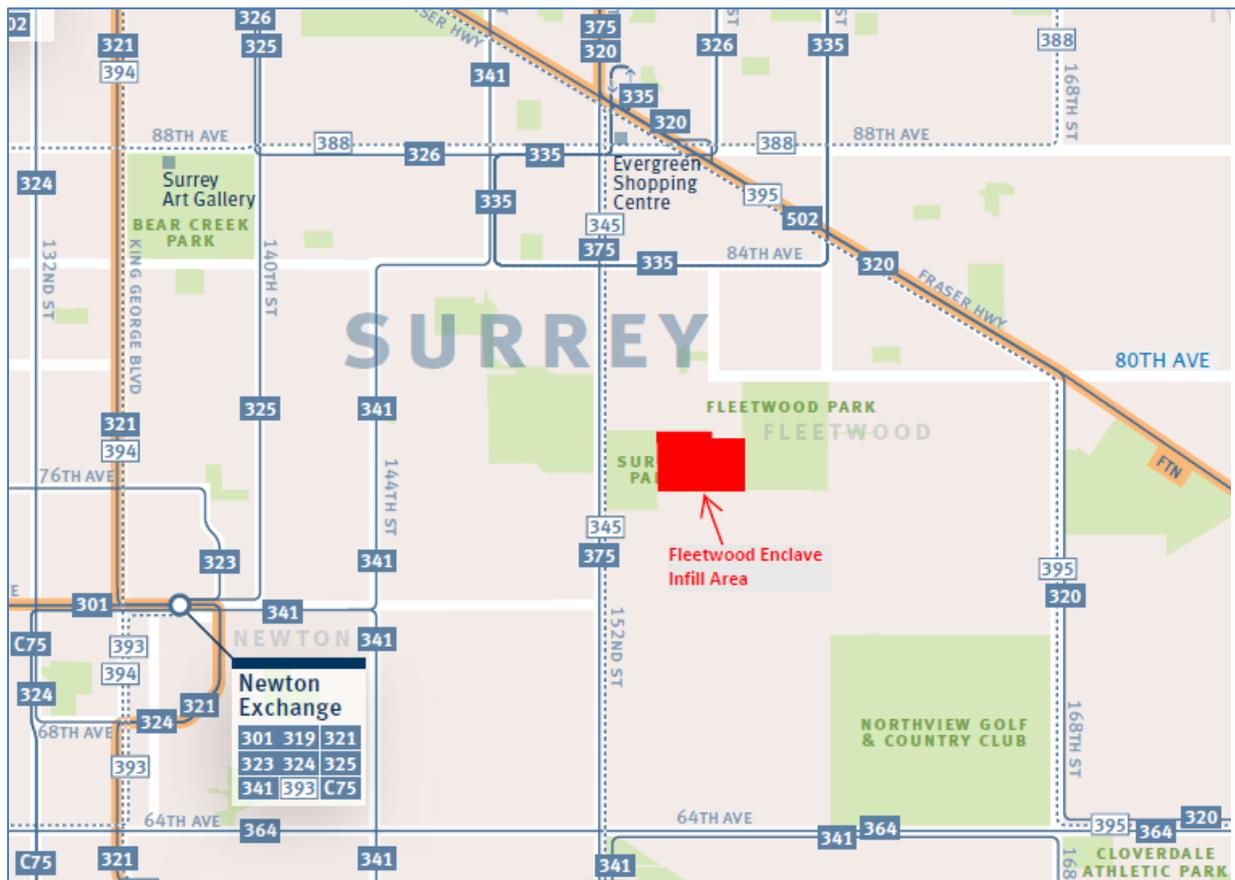


Figure 2 – Current Road Network

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**.

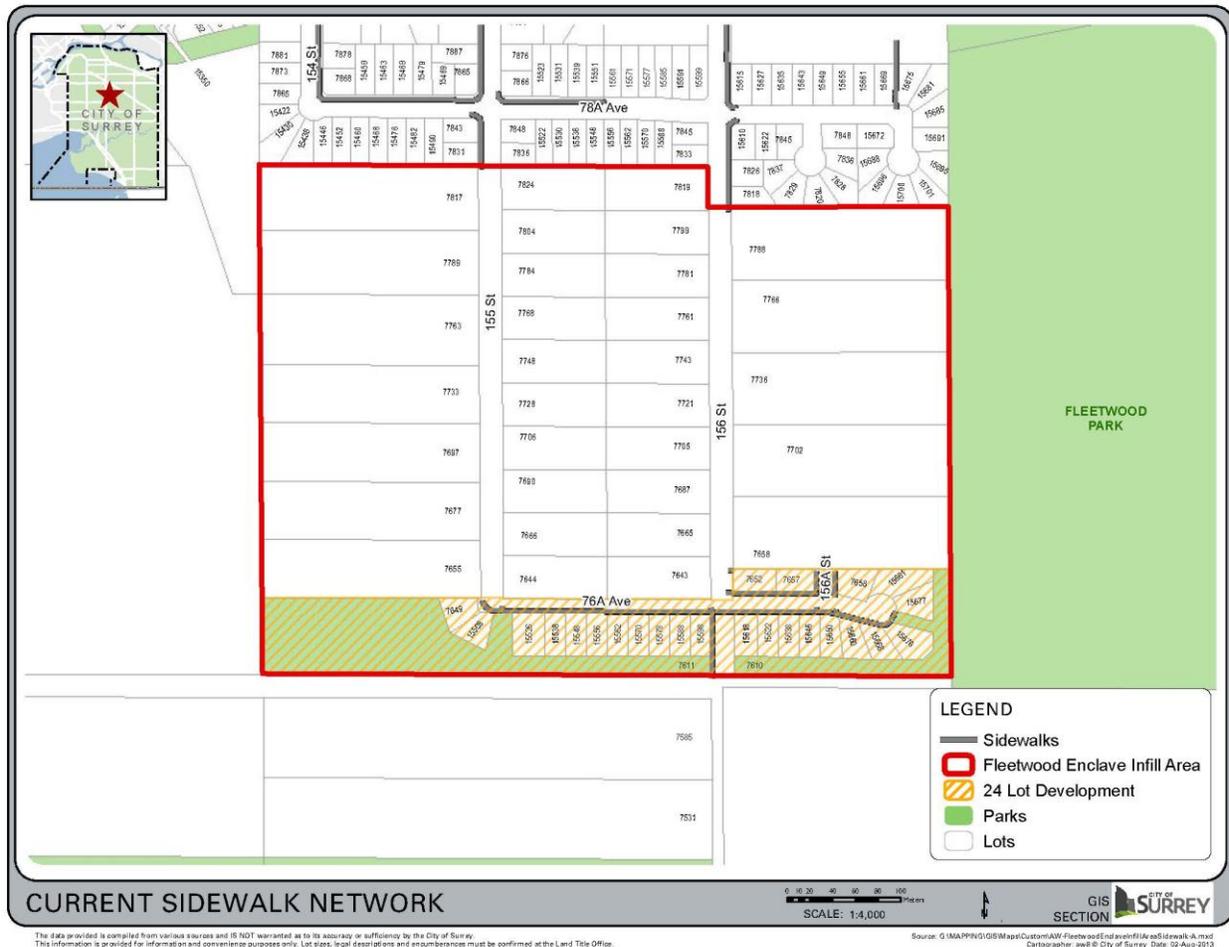


Figure 4 – Current Sidewalk Network

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.

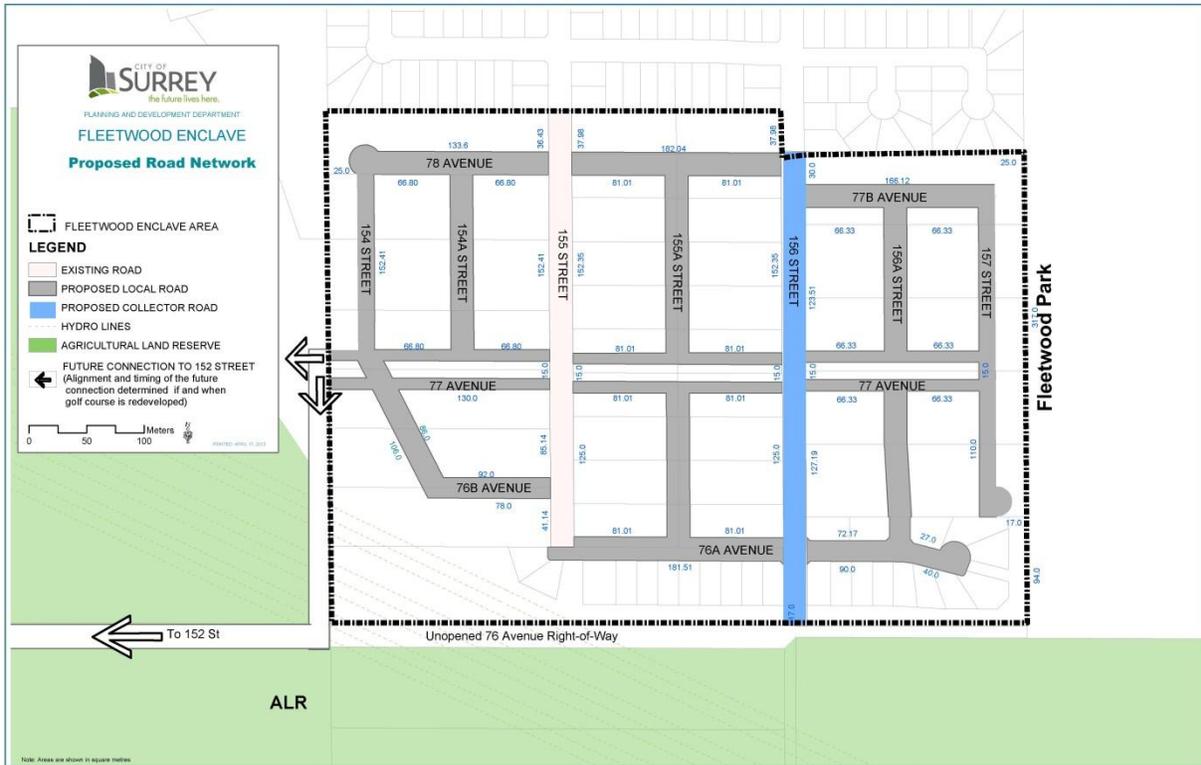


Figure 5 – Proposed Road Network

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**.

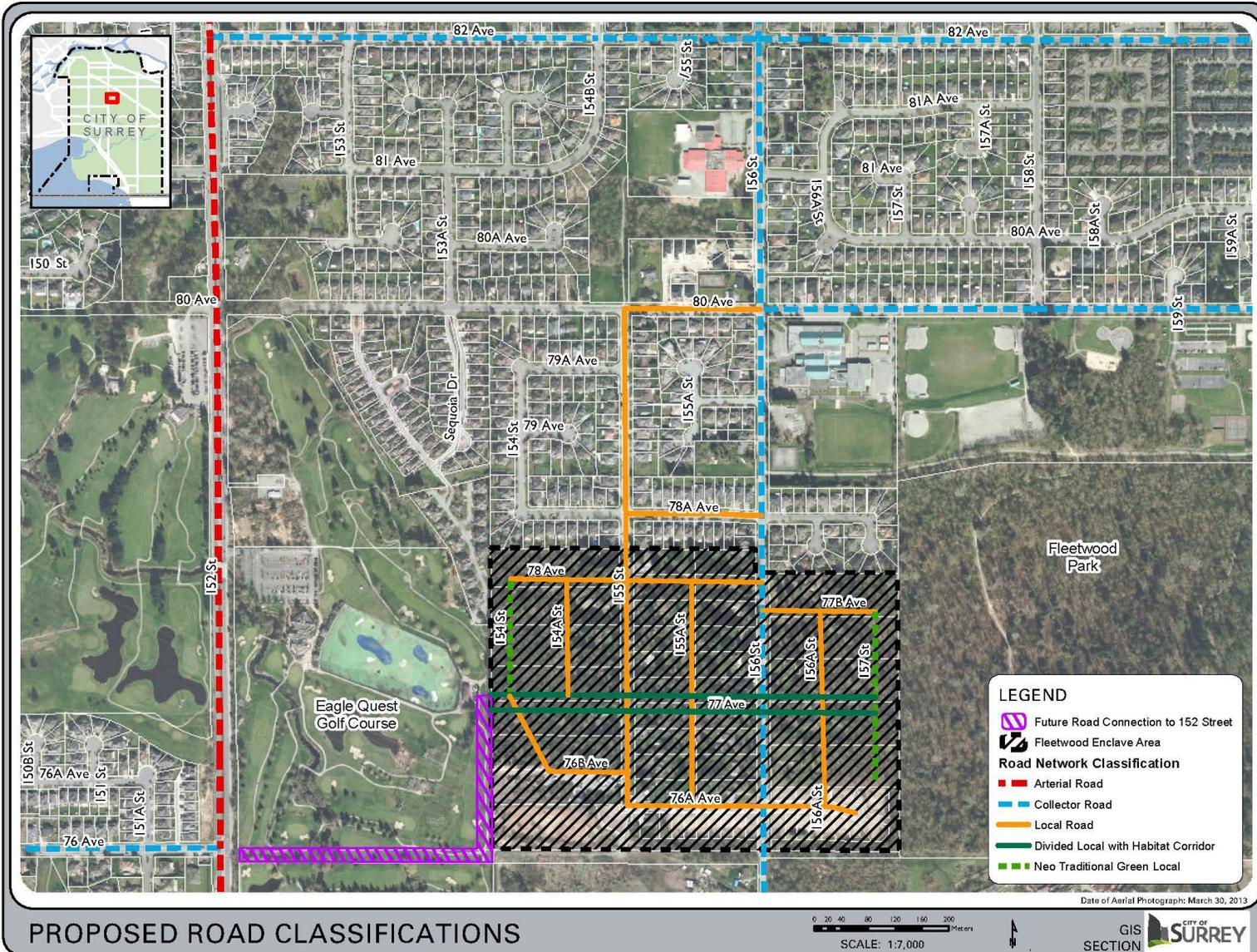


Figure 6 – Proposed Road Classifications

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.

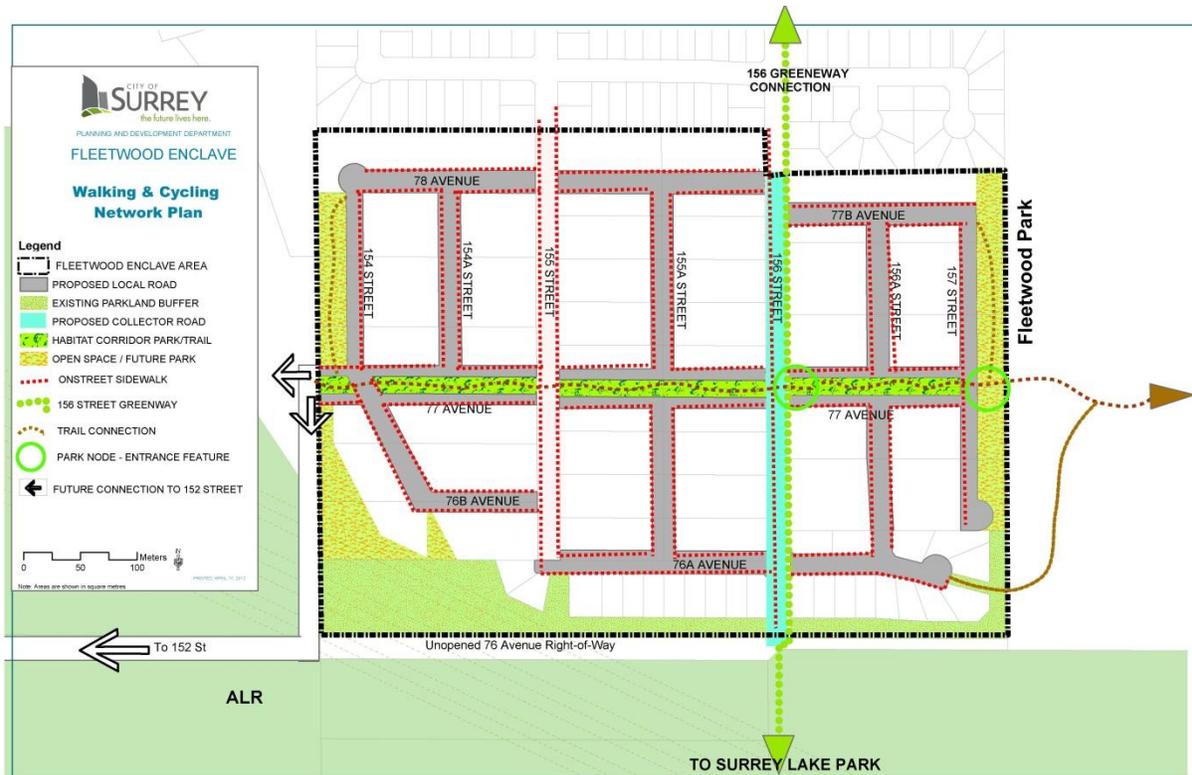


Figure 7 – Pedestrian Network Plan

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.

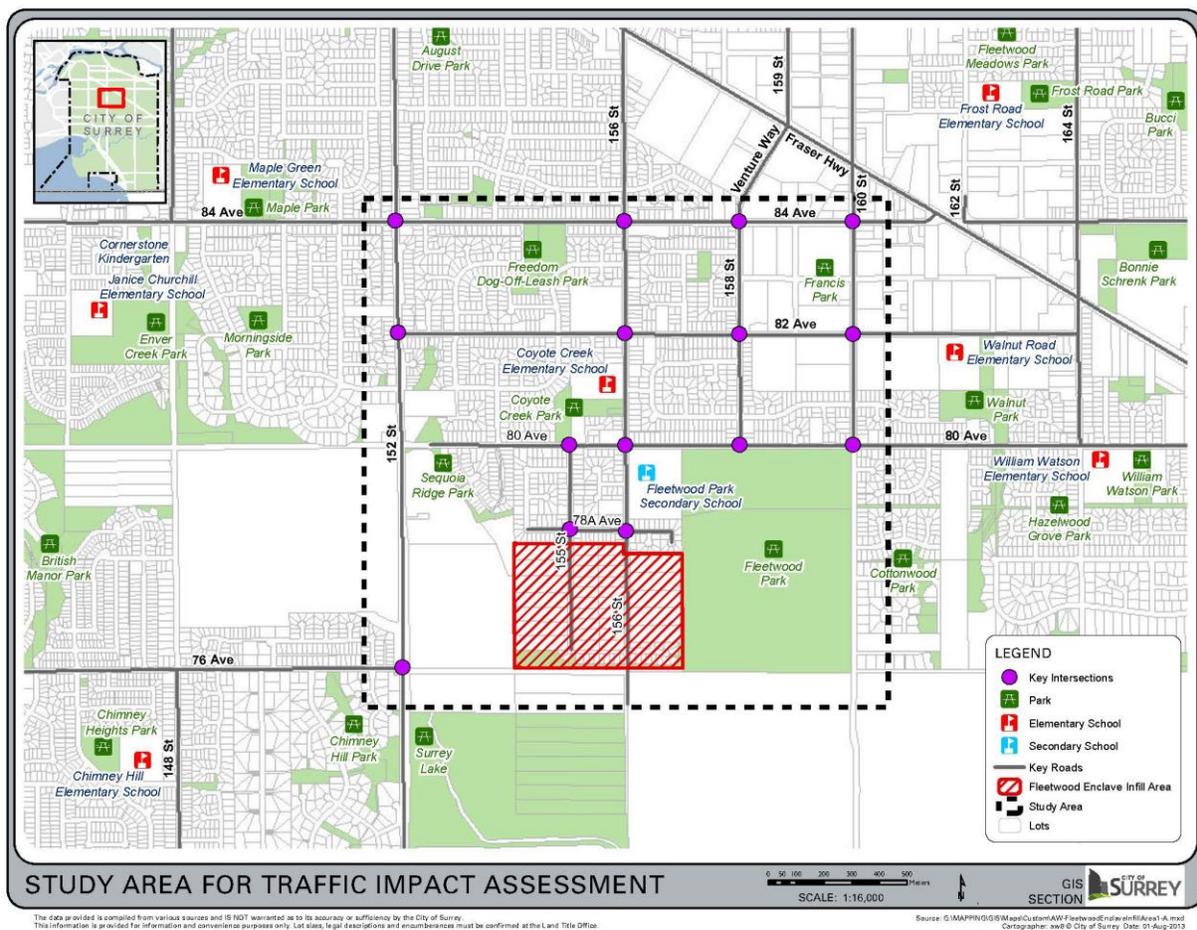


Figure 8 – Traffic Impact Assessment Study Area

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.

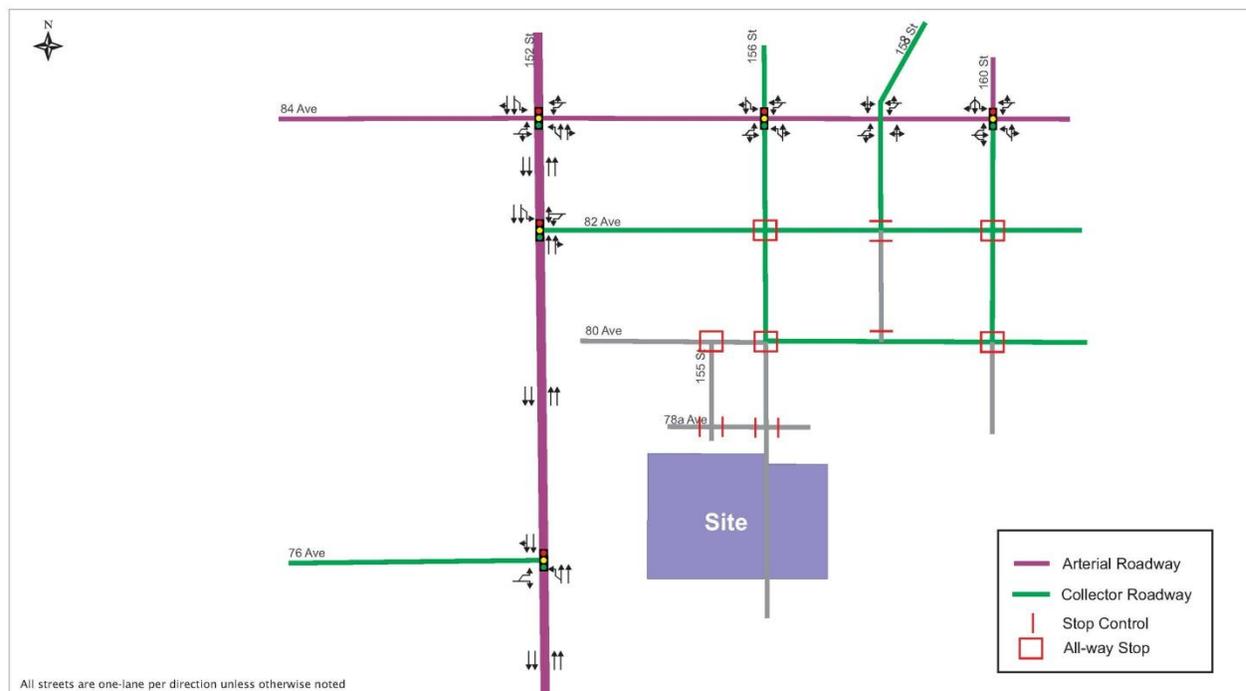


Figure 9 – Road Classifications and Traffic Controls in the Study Area

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.

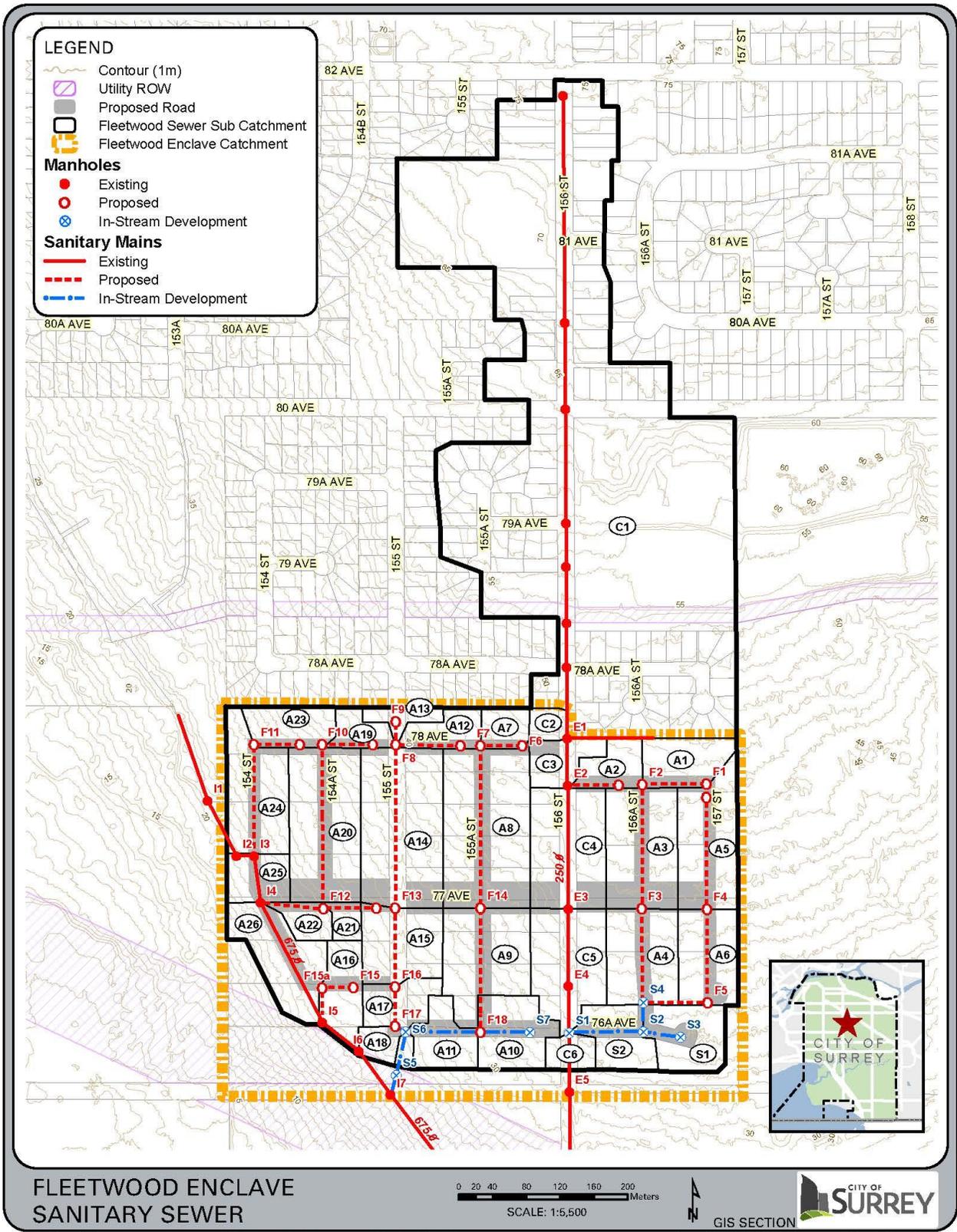


Figure 10 – Proposed Sanitary Sewer System

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.

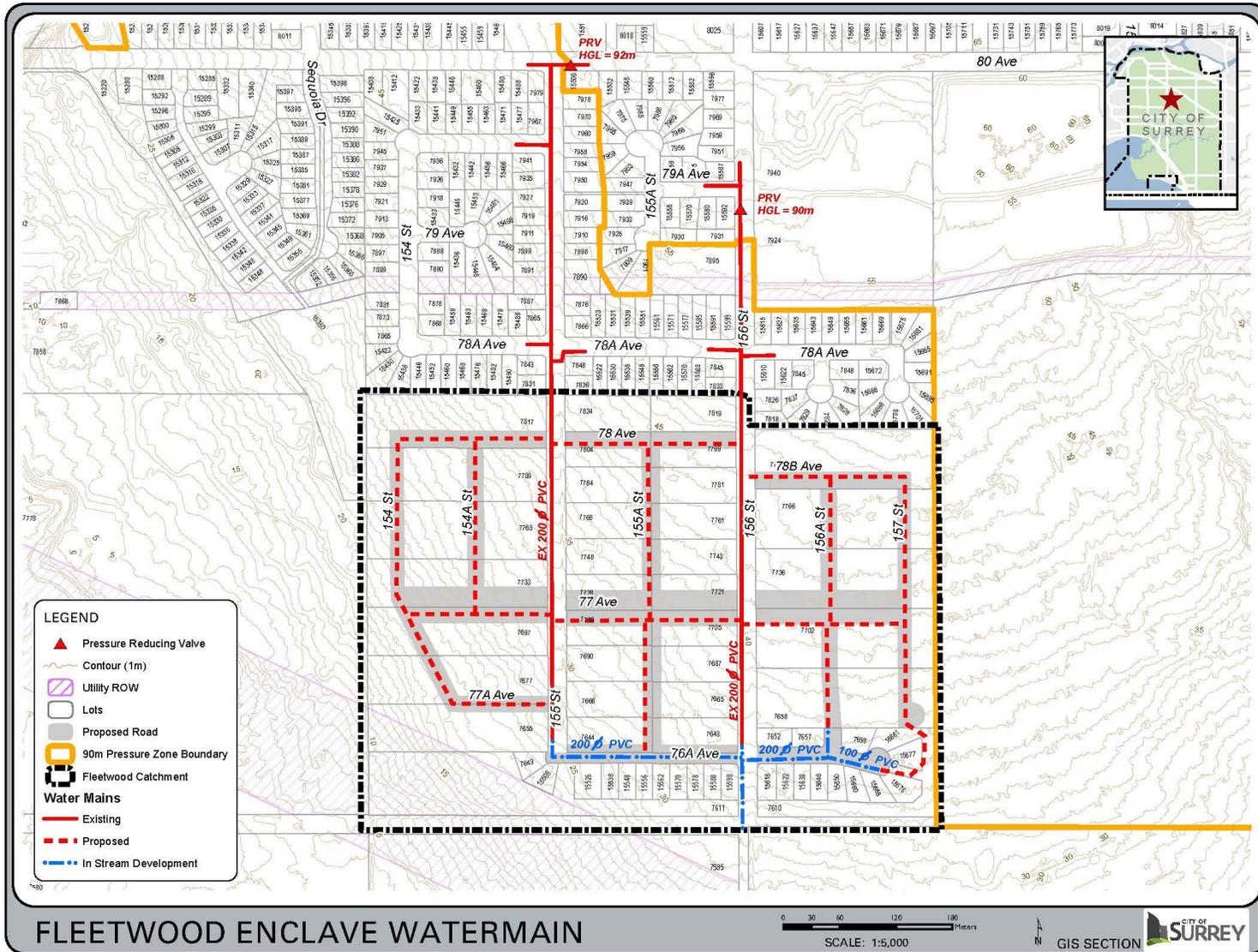


Figure 11 – Proposed Water Distribution System

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.

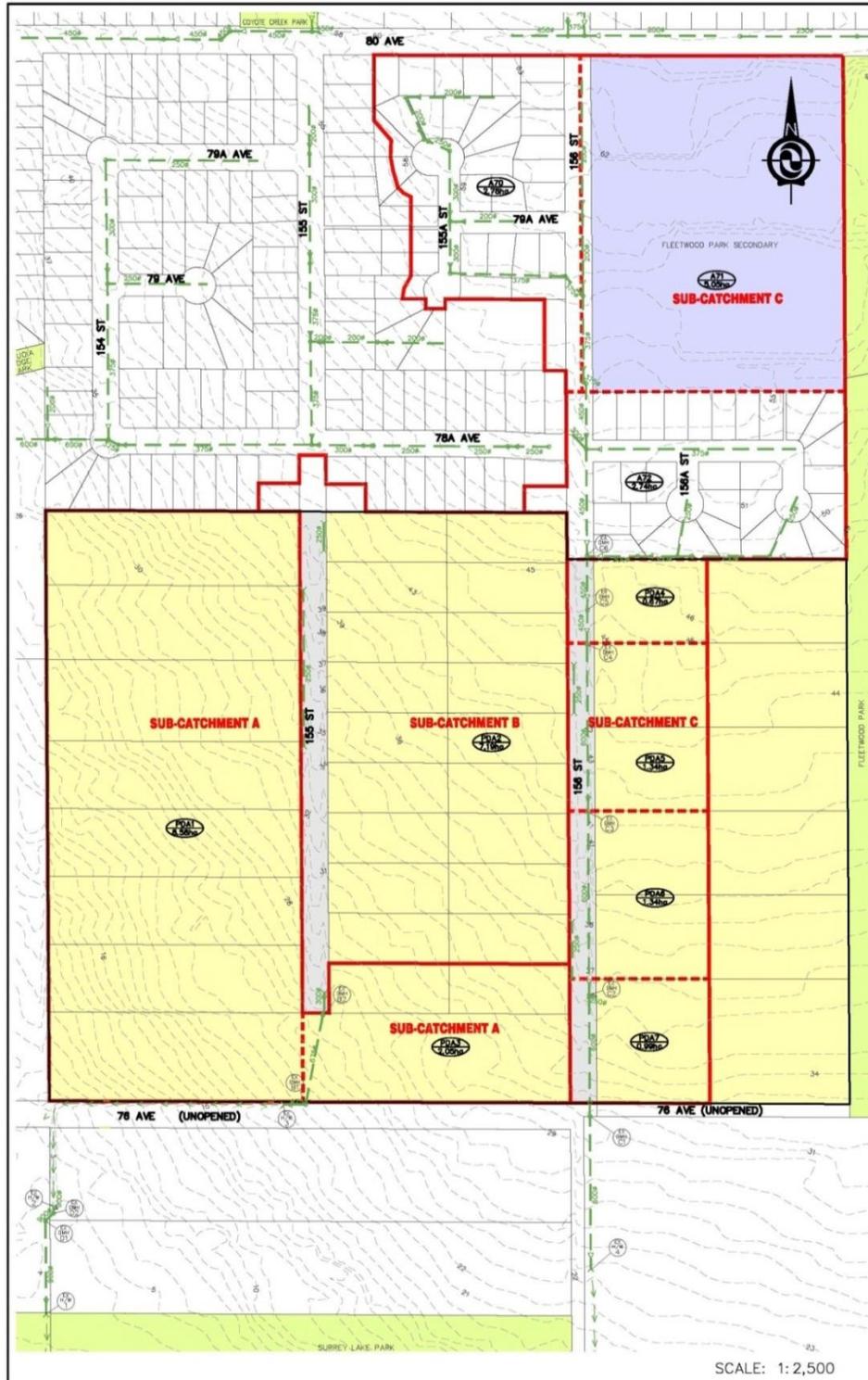


Figure 12 – Existing Stormwater Sub-Catchments and Infrastructure

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.

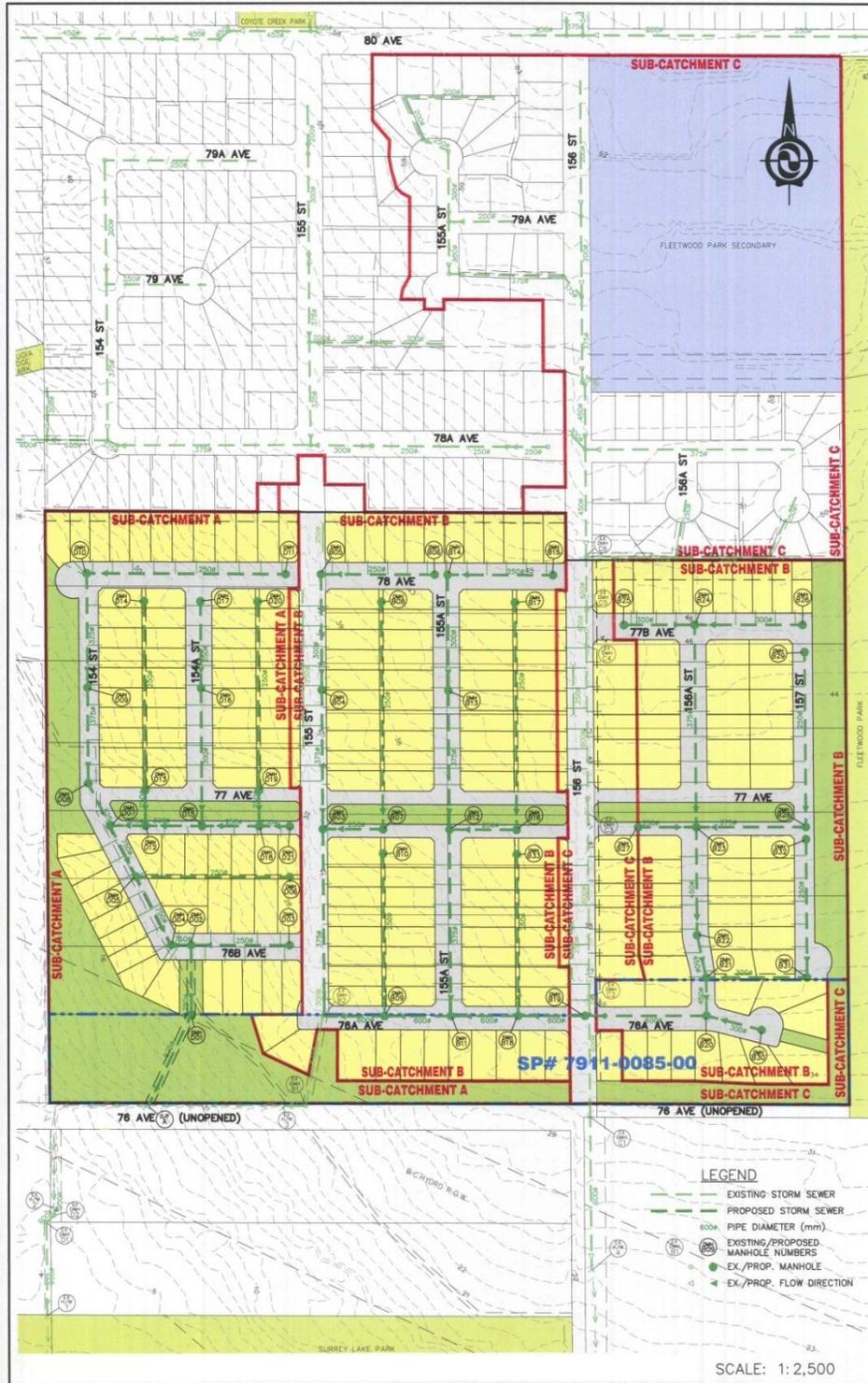


Figure 13 – Proposed Stormwater Sub-Catchments and Infrastructure

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.

Acknowledgements

The City of Surrey acknowledges the contributions and participation of the following people and organizations in the Fleetwood Enclave Infill Area Plan preparation process:

City of Surrey

Don Luymes	Community Planning Manager	Planning & Development
Chris Atkins	Planner II	Planning & Development
Markus Kischnick	Planner	Planning & Development
Laura Hardiman	Special Projects Engineer	Engineering
Robert Lee	Sewer Engineer	Engineering
KK Li	Water Engineer	Engineering
Carrie Baron	Drainage Engineer	Engineering
Mirjana (Mira) Petrovic	Transportation Engineer	Engineering
Philip Bellefontaine	Transportation Planning Manager	Engineering
Remi Dube	Development Services Manger	Engineering
Jeff Arason	Manager, Utilities	Engineering
Patrick Klassen	Parks Planner	Parks Planning & Design
Ted Ulrich	Manager	Parks, Planning & Design
Stuart Jones	Senior Planner	Planning & Development
Carlos Castro	GIS Specialist	Planning & Development

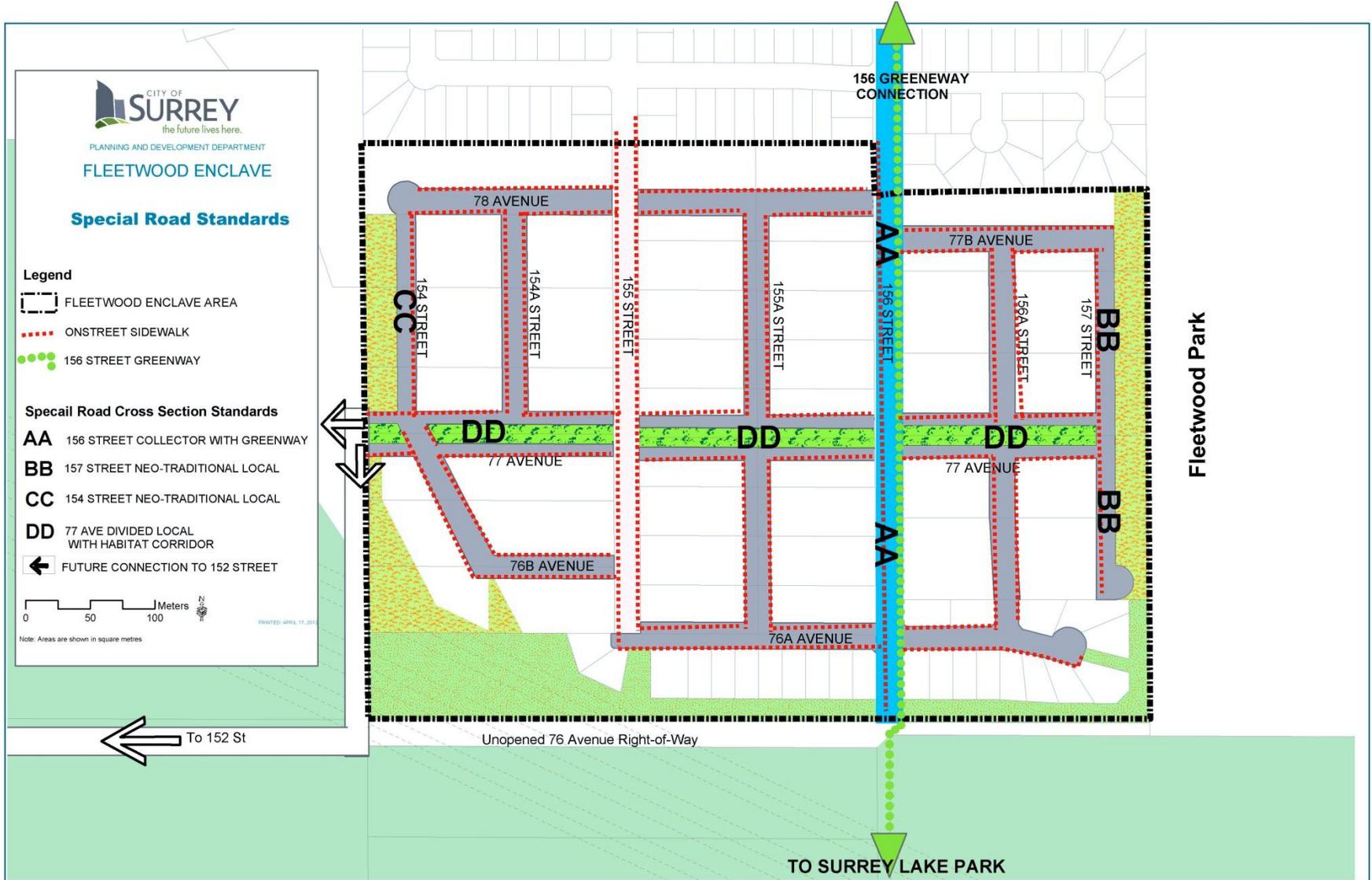
Surrey School Board

Umur Olclay	Facilities Manager	Surrey School Board
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Consultants

Michael Coulthard	Diamond Head Consulting Ltd.
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.

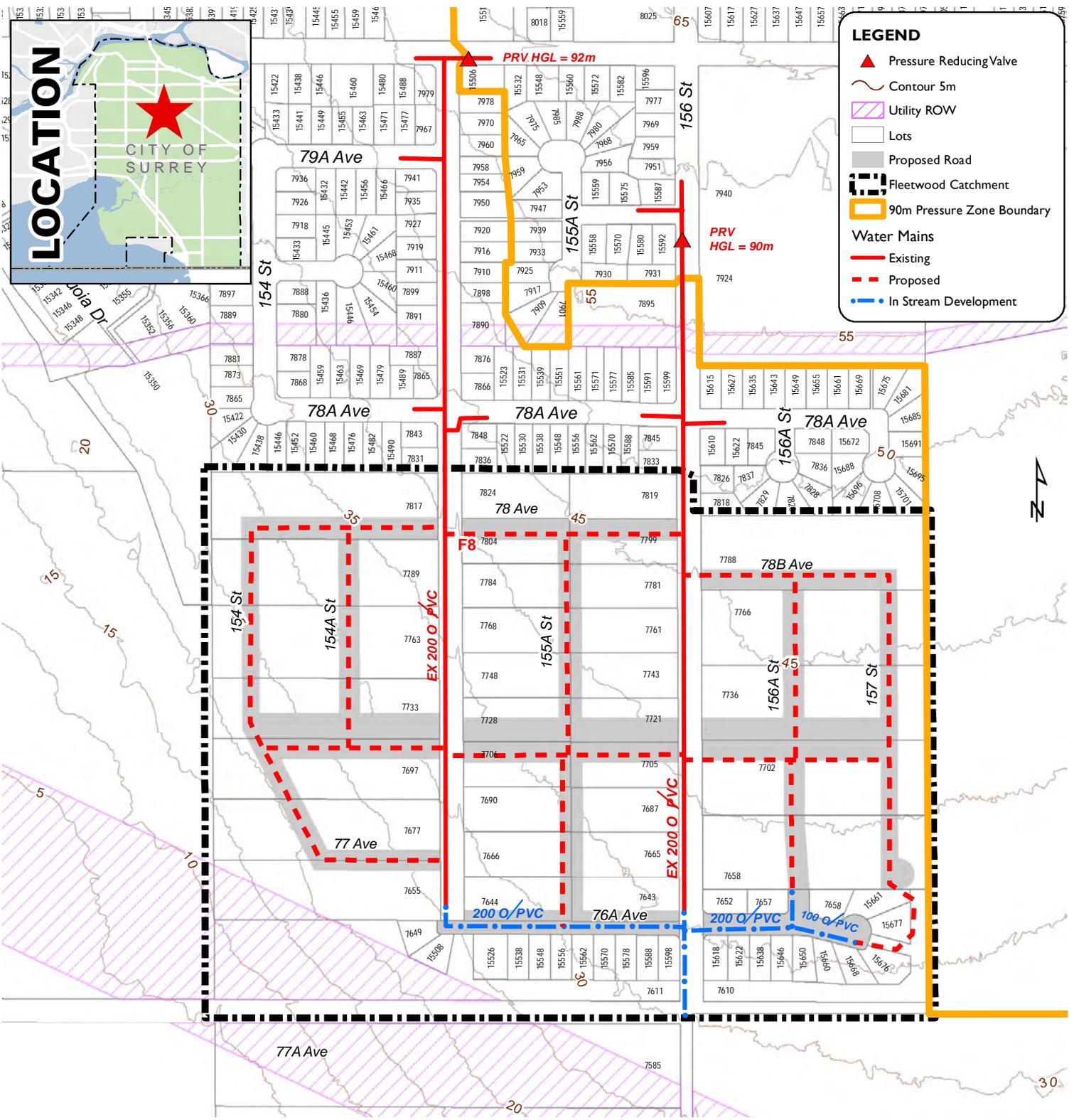
Appendix III – Fleetwood Enclave Transportation Impact Assessment by Bunt & Associates, October 2012

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.

APPENDIX II SITE PLAN



LEGEND

- Pressure Reducing Valve
- Contour 5m
- Utility ROW
- Lots
- Proposed Road
- Fleetwood Catchment
- 90m Pressure Zone Boundary
- Water Mains**
- Existing
- Proposed
- In Stream Development

Produced by GIS Section: 03-Sep-2013, C6S

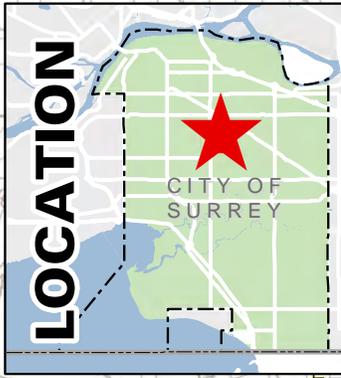


FLEETWOOD ENCLAVE WATERMAIN

ENGINEERING
DEPARTMENT

The data provided is compiled from various sources and IS NOT warranted as to its accuracy or sufficiency by the City of Surrey. This information is provided for information and convenience purposes only. Lot sizes, Legal descriptions and encumbrances must be confirmed at the Land Title Office.

APPENDIX III SITE PLAN



LEGEND

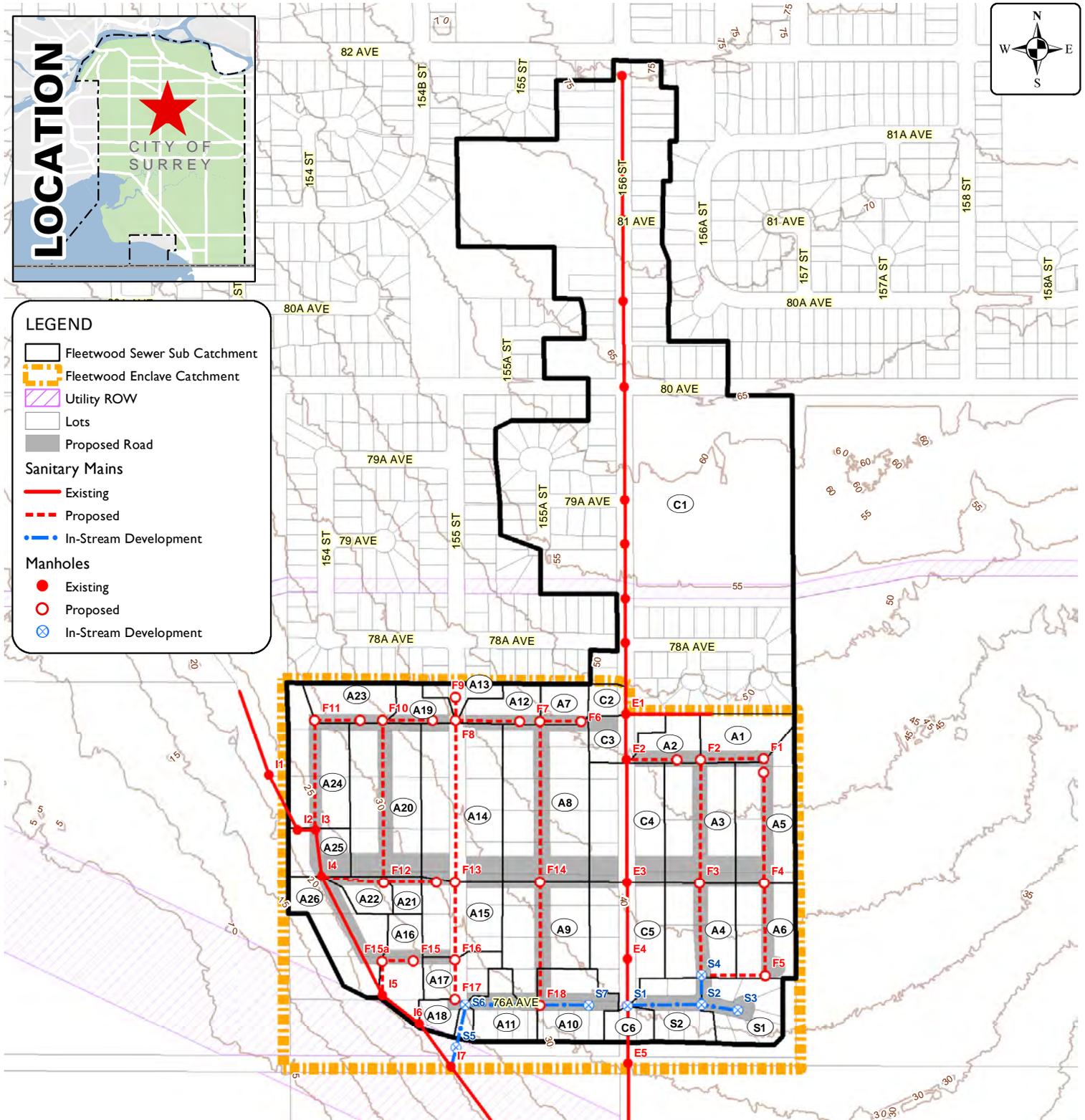
- Fleetwood Sewer Sub Catchment
- Fleetwood Enclave Catchment
- Utility ROW
- Lots
- Proposed Road

Sanitary Mains

- Existing
- Proposed
- In-Stream Development

Manholes

- Existing
- Proposed
- In-Stream Development



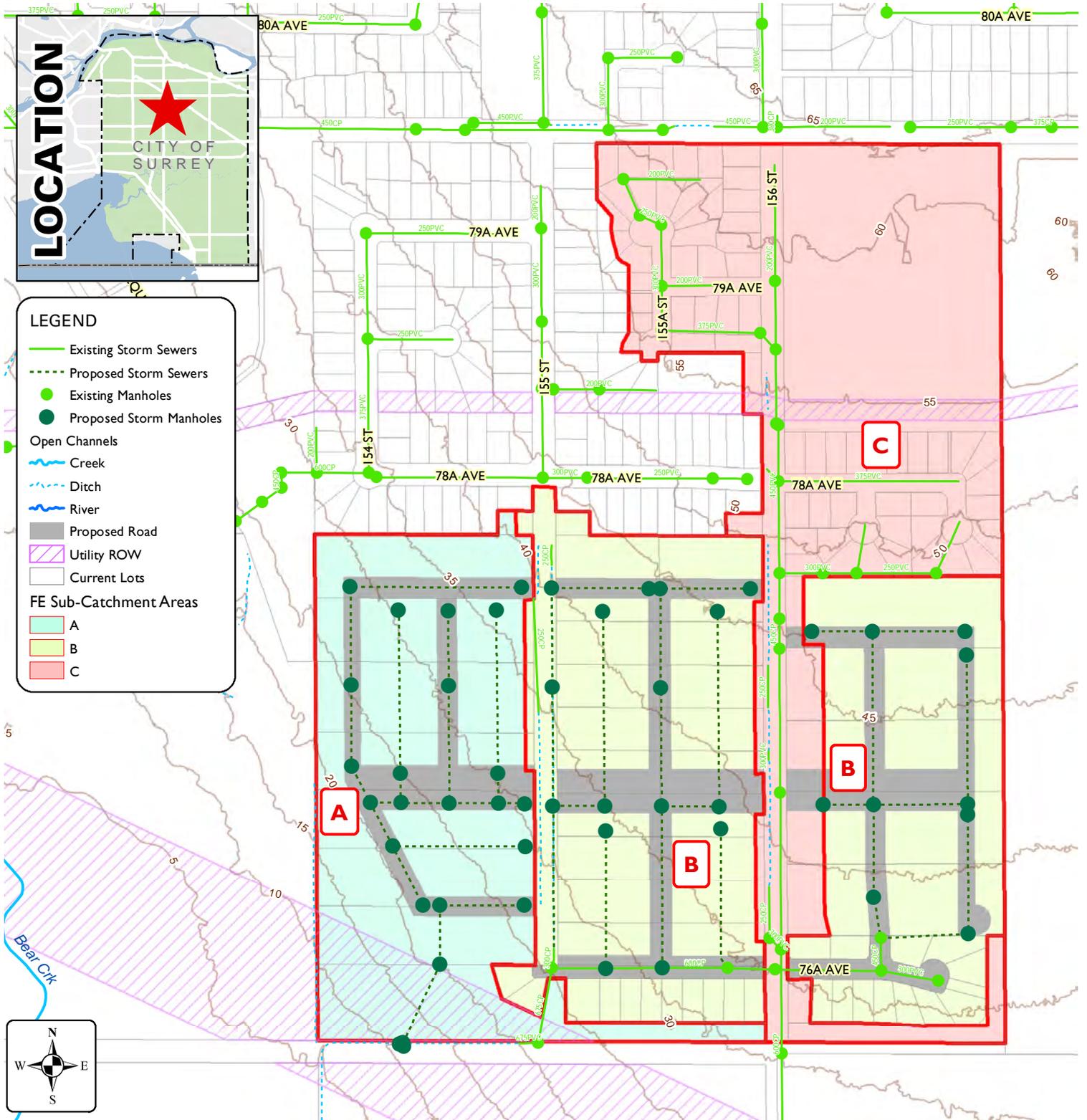
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FLEETWOOD ENCLAVE SANITARY SEWER

ENGINEERING
DEPARTMENT

APPENDIX IV SITE PLAN



FLEETWOOD ENCLAVE STORMWATER MANAGEMENT

ENGINEERING
DEPARTMENT



PLANNING AND DEVELOPMENT DEPARTMENT

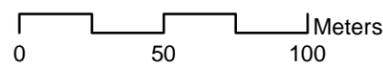
FLEETWOOD ENCLAVE

APPENDIX V Proposed Road Network

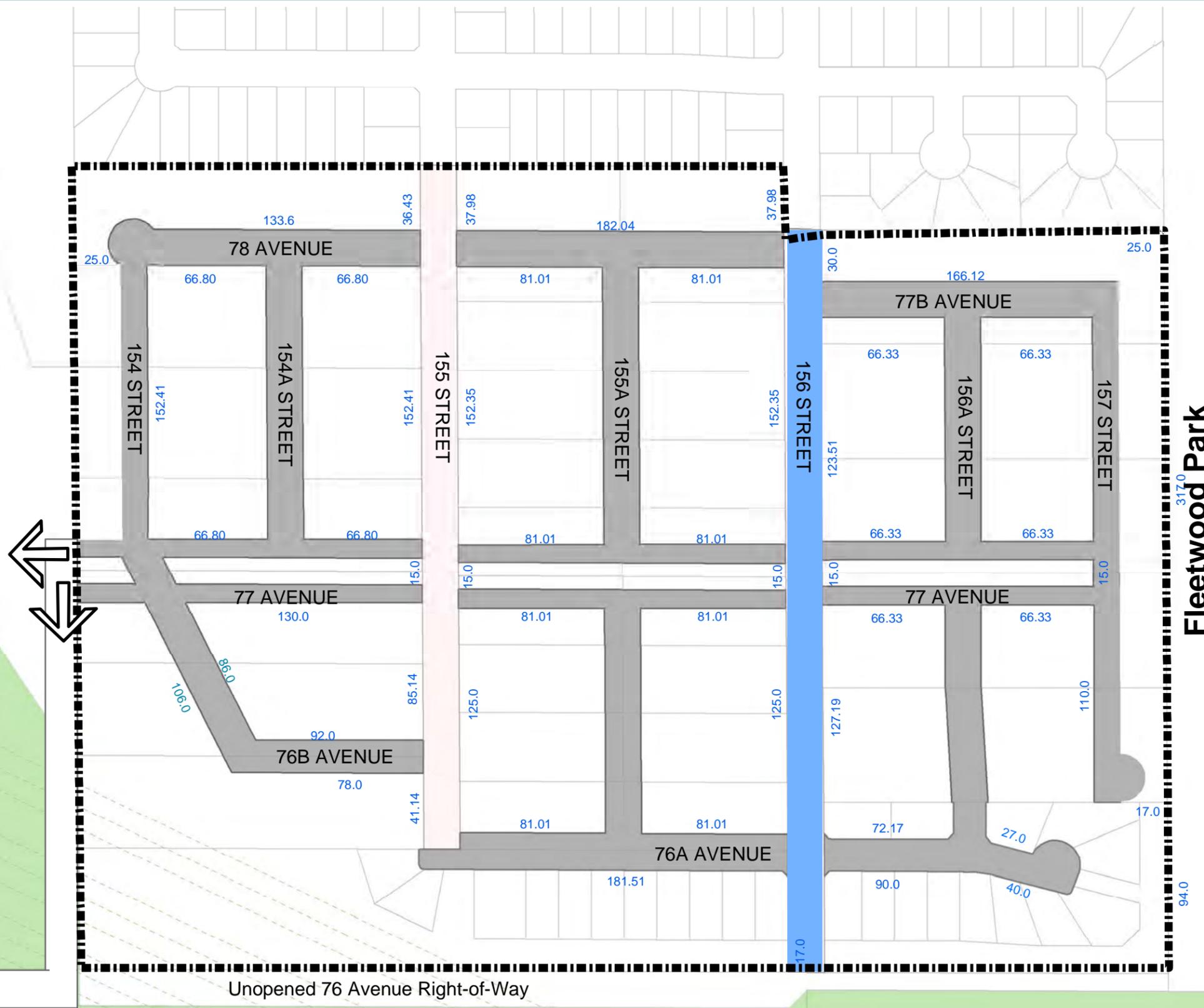
FLEETWOOD ENCLAVE AREA

LEGEND

- EXISTING ROAD
- PROPOSED LOCAL ROAD
- PROPOSED COLLECTOR ROAD
- HYDRO LINES
- AGRICULTURAL LAND RESERVE
- FUTURE CONNECTION TO 152 STREET
(Alignment and timing of the future connection determined if and when golf course is redeveloped)



PRINTED: APRIL 17, 2012



Fleetwood Park

To 152 St

ALR

Note: Areas are shown in square metres



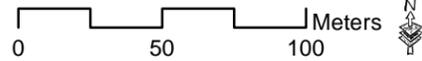
PLANNING AND DEVELOPMENT DEPARTMENT

FLEETWOOD ENCLAVE

APPENDIX VI Walking & Cycling Network Plan

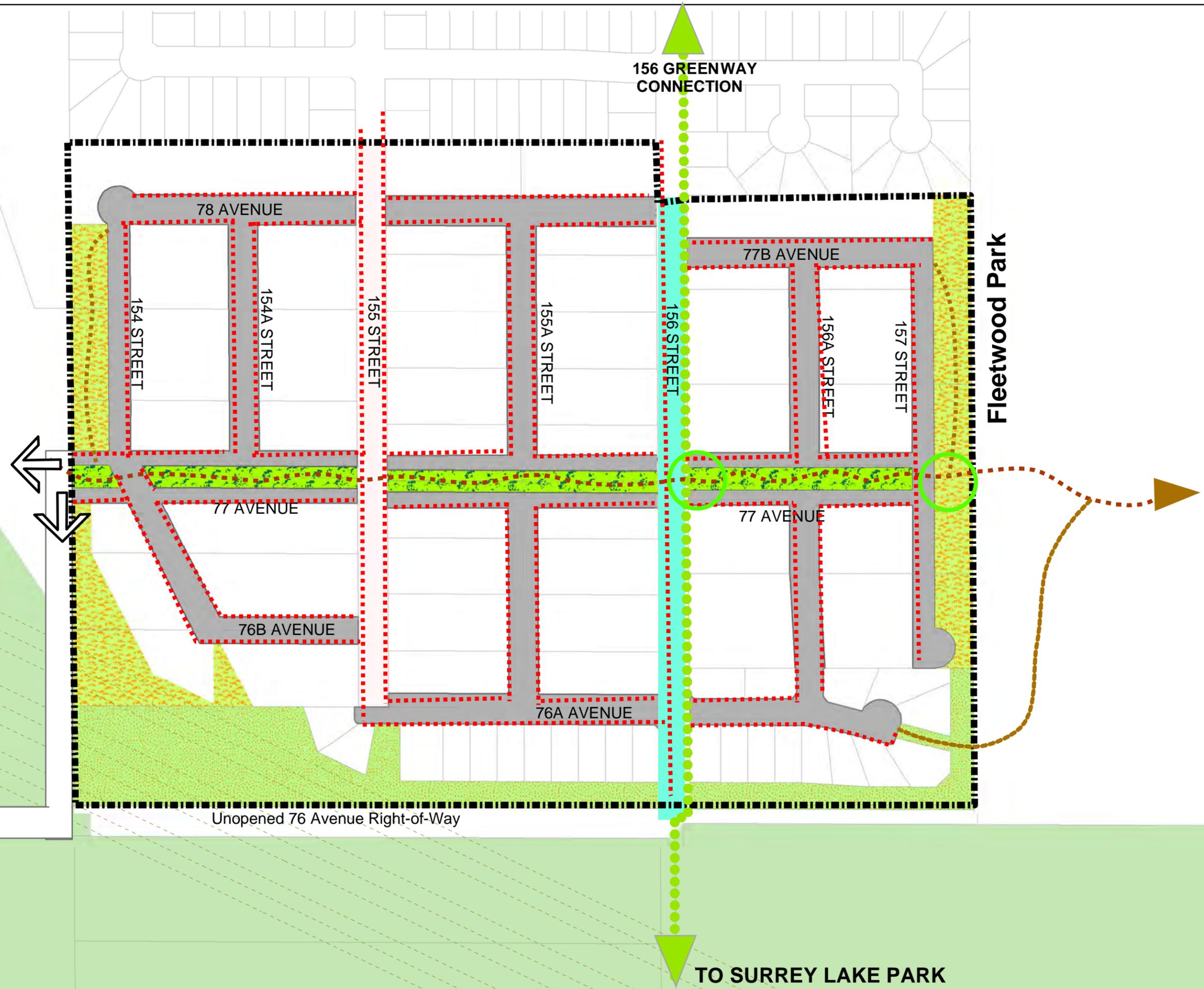
LEGEND

-  FLEETWOOD ENCLAVE AREA
-  PROPOSED LOCAL ROAD
-  EXISTING PARKLAND BUFFER
-  PROPOSED COLLECTOR ROAD
-  HABITAT CORRIDOR PARK/TRAIL
-  OPEN SPACE / FUTURE PARK
-  ONSTREET SIDEWALK
-  156 STREET GREENWAY
-  TRAIL CONNECTION
-  PARK NODE - ENTRANCE FEATURE
-  FUTURE CONNECTION TO 152 STREET



PRINTED: APRIL 17, 2012

Note: Areas are shown in square metres



To 152 St

ALR

Unopened 76 Avenue Right-of-Way

TO SURREY LAKE PARK

156 GREENWAY
CONNECTION

Fleetwood Park

APPENDIX VII

10 Year Servicing Plan Projects

The projects listed in the following tables are proposed to be included into the 10-Year Servicing Plan.

Transportation – Arterial Roads

Project	Project Cost	Growth Cost Component (DCC)
152 Street / 82 Avenue: Install a new westbound right turn lane within the existing right-of-way	\$150,000	\$150,000
152 Street / 84 Avenue: Widen 84 Avenue to accommodate dedicated westbound and eastbound through lanes on the approaches to 152 Street	\$520,000	\$520,000
152 Street / 84 Avenue: Lengthen the westbound left turn storage lane to 75m	\$16,000	\$16,000

Transportation – Non-Arterial Roads

Project	Project Cost	Growth Cost Component (DCC)
156 Street: 76A Avenue to 80 Avenue: Upgrade 156 Street to collector status	\$2,500,000	\$360,000