



**Sensitive Urban Infill Charette Report**  
*City of Surrey*

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*Cover image of possible future for King George Highway at 72nd street, looking northeast, by Neda Roonia.*

## TABLE OF CONTENTS

Introduction	1
 ensitive Urban Infill Concept Plan	12
 OME team	16
 O team	44
 ORK team	62
 REEN team	80
 PPENDIX ONE: Proposed Street Sections	102
 PPENDIX TWO: Measuring Energy and Greenhouse Gas Emmissions	108
 PPENDIX THREE: Research Bulletin 1: Demographics	110
 PPENDIX FOUR: Research Bulletin 2: District Energy	122

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*Mayor's Message*  
*October 2012*

On behalf of Surrey City Council, I am pleased to present the 'Sensitive Urban Infill' City of Surrey Charette Report.

The City of Surrey has entered into an exciting phase of its history. Having developed into the region's next metropolitan centre and no longer a suburb, Surrey is poised to attract impressive economic and population growth in the coming decades. With this multifaceted growth come many challenges that require careful and strategic planning to ensure Surrey's sustainable future.

Guided by the core principles of the City of Surrey's 'Sustainability Charter', this report informs us how Sensitive Urban Infill will occur in Surrey based on a projected 50 year period. Taking all of the important factors of sustainable future growth in to consideration, an integrative strategy has been developed to suggest how we can shape the growth of Surrey's existing neighbourhoods.

As you review this report, I trust that you will find it informative on how Surrey is continuing in its path as an innovative City of the future.

Sincerely,

A handwritten signature in black ink, appearing to read "Dianne L. Watts". The signature is fluid and cursive.

Dianne L. Watts  
Mayor

*Project Goal : To suggest how to shape the growth of Surrey's existing neighbourhoods towards a future where very little greenhouse gas is produced and communities are complete, affordable, and socially sustainable.*

# Sensitive Urban Infill



Surrey is no longer a suburb. Surrey is the region's second great city - and its fastest growing one at that. Yet the majority of its land has either already been developed or is protected agricultural or habitat lands. The newer parts of the city are using remaining precious land efficiently, providing more dwelling units per hectare than ever before. And older parts of the city, especially hubs identified as new city centres or sub centers, are increasingly the site of high density mixed use developments, the new and vital Surrey City Centre in particular. But these advances apply to a relatively small percentage of the city's land. The majority of the city's land is already built out; neighbourhoods built during the first three decades of the city's most rapid growth.

This project is an attempt to provide a detailed examination of these existing neighbourhoods, and assess how they might grow and change as the city also grows and changes – *how these districts might help create a city that produces very little greenhouse gas, is complete, affordable, and socially sustainable*. These goals are the bedrock of the City's guiding Sustainability Charter.

But how is all of this, realistically, to be accomplished? By two means. First we acknowledge that already built out districts change, but slowly. We anticipate a period of 50 years to accomplish all of this. Second, we know that cities are systems, and that systems require multi-disciplinary and creative approaches. To ensure that our proposals are both integrated and practical they have been collaboratively generated. A cross disciplinary team comprised of City of Surrey staff, facilitated by UBC Design Centre for Sustainability personnel, offers these consensus suggestions for further consideration.



Back Row: Remi Dube, Gertrude Kwan, Pat Lau, David Sadler, Keith Broersma, Mary Wong, Neda Roohnia  
 Row 4: Philip Bellefontaine, Andrew Dong, Don Luymes, Helen Chan, Kristin Teide, George Fujii, Ron Hintsche  
 Centre Row: Carla Stewart, Kelsey Swanson, Patrick Klassen, Jason Owen, Tom Ainscough, Jennifer Marshall, Sheryl Webster  
 Row 2: Aileen Murphy, Preet Heer, Chris Atkins, Markus Kishnick, Colleen Kerr, David Hislop, Sara Barron  
 Front Row: Erin Schultz, Ted Uhrich, Maggie Baynham, Hernan Bello, Patrick Condon, Rob Lane  
 Stairs: Daniel Roehr, James Tuer, Ron Walkey, Susan Milley, Sam Khany

## Project Process

The Sensitive Urban Infill project was a collaborative, multi-stage project that involved City staff, researchers, and facilitators working together over a series of months. While this project was focused on sensitive urban infill, the integrated-systems nature of sustainability means that it also afforded the opportunity to contribute to the implementation of other aspects of Surrey's sustainability agenda.



The project included three key events:

### **Workshop 1: Goals and Objectives Workshop** (May 2011)

The goals and objectives workshop integrated the City of Surrey's established bylaws, policies, and planning objectives, particularly the City of Surrey Sustainability Charter, and other related municipal and provincial plans and policies into a collaboratively authored goals and objectives document.

The objectives discussed and approved at the first workshop were used to structure the investigations of the charrette. Thus the following chapters of this report are organized by objectives, first restating the approved objectives and then providing the strategy arrived at to achieve that objective.

### **Workshop 2: Design brief workshop** (October 2011)

The design brief established performance objectives and numeric targets to be used during the charrette.

Leading up to the second workshop, key issues were identified as needing further research. Research bulletins were prepared about Demographics and District Energy. See appendices 3 and 4.

### **Design Charrette** (January 2012)

The charrette translated the words and numbers from the design brief into meaningful concepts, pictures, and diagrams that make up this report. During this event integration of creative ideas occurred, so that the resulting strategies and actions for sensitive urban infill in Surrey are both innovative and achievable.

Through this process, the team identified strategies and actions that would achieve the sustainability objectives endorsed at the first workshop. These include: increasing and diversifying the local employment and tax base; promoting economic synergies; creating an efficient transit system; decreasing lifecycle infrastructure costs; enhancing food security through integration of community agriculture; and achieving dramatically reduced greenhouse gas emissions.

Developing a collaborative plan for a sustainable district can be complex. The task was made manageable by separating the task into four issue areas, and assigning an appropriate team of experts to attack each issue. Later in the process teams were mixed to ensure that the plan was ultimately one that integrated all four issues. The first group of issues were those associated with community and housing design; we named that group the **Home team**. The second group of issues were those associated with movement in its many forms; we called that group the **Go team**. The third group of issues associated with economic development and employment; we called that group the **Work Team**. Last but not least were the issues associated with environmental and energy issues; we called that group the **Green Team**. This report is organized according to these 4 teams. The collaboratively derived team objectives from Workshops One and Two are listed, followed by the design and planning strategies developed at the charrette to achieve these objectives.

## HOME

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Certainly any changes to mature areas of the city must work with, not against, organic changes already in progress. The study area chosen, roughly the area drained by Bear Creek and lying between Surrey City Centre, Fleetwood Town Centre, and Newton Town Centre, is already home to over 70,000 people. Far from being finished and stable, this built out area continues to grow in population, adding over 1.5% in new population per year. Some of this population growth comes in the form of new apartment and townhouse construction. But a surprising proportion of this growth is induced by cultural and demographic changes. Families are changing. While the fertility rate for women in the Metro Vancouver region continues to decline, the influx of immigrant families into this particular study area, with their greater than average tendency to form multi-generational households, have offset the trend of declining household sizes. Family sizes in the City of Surrey have actually increased slightly over the decades, bucking regional and national trends. This has forced houses, streets, and districts to accommodate many new demands. This project is an attempt to first understand these new demands, and to then suggest changes to policies that can accommodate these trends while achieving the City's Sustainability Charter objectives.



## GO

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A second dramatic change is underway. This district, like most Canadian districts built during the period of suburban expansion, was organized around the car. Walking was rare, bus service infrequent, and commercial services distant. But now new light rail systems are proposed that will soon serve both sides of the study area, buses will serve many of the arterials at fifteen minute intervals or less, an increasing number of trips are made by biking and walking, and the appetite for commercial services within easy walking distance is huge. This project is an attempt to suggest design, policy and engineering changes that can accommodate these new demands.



## WORK

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Third and perhaps most important: jobs. The study area was originally built to provide spacious homes for families whose breadwinner commuted very long distances by car to work. In those days the number of workers living in Surrey far exceeded the City's total number of jobs. This is no longer the case. The number of jobs in the City of Surrey now comes closer to the number of workers in the city. But getting to and from these jobs is still a problem, as they are widely dispersed and still often far from residential districts or from the frequent transit links necessary to reduce car dependence. This project is thus also an attempt to suggest planning and transportation policies that can bring jobs closer to homes, homes closer to jobs, and convenient transportation links to bring them even closer.

## GREEN

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Finally, when this district was built our understanding of the value of natural systems was limited. Thankfully major streamways were preserved; but recent science has proven that urban development can dramatically compromise natural systems function, killing species at risk and destroying green amenities. This project is, finally, an attempt to use our new understanding to both protect and capitalize on the City's green infrastructure. Design, planning, recreational, and environmental protection strategies are proposed to achieve these ends.



# Project Meta-Targets

**POPULATION:** *double the population within the study area.*

Population increase from **76,495** to about **153,000** by 2061

Based on the 2006 census numbers, the study site housed 76,495 people and 27,455 households. The average family size is 2.8 people per household. Through a simple linear extrapolation of the current household growth trendline into the future, it can be projected that this area will be home to about 59,538 households by 2061. If the average family size of 2.8 people per household remains the same, then there will be about 166,700 people in the area, or a slightly more than doubling of the population.

The average household size in the City of Surrey, however, is around 3 people per household. If we use this number for our 2061 projection, we arrive at an upper limit projection of about 178,600 people in the area.

The majority of the study site falls within Newton area of Surrey, which had a population of 115,520 people in 2006, and is projected to have a population of 239,256 by 2061 (based on the city of Surrey's projection until 2041 and our linear extrapolation into 2061). This site currently houses about 66% of the Newton population, and if we assume it will maintain the same ratio into the future, this site will house 158,431 people.

Therefore, given these numbers, a doubling of the population by 2061 seems to be a conservative estimate, particularly given that the City of Surrey as a whole is predicted to increase its population by 2.5 times in the same time period.

**JOBS:** *provide at least one job per dwelling unit.*

Job increase from **27,940** to about **50,000** by 2061.

The study area currently provides about one job for every dwelling unit, and the charrette team chose to maintain this ratio in an effort to support local employment.

## GREENHOUSE GAS EMISSIONS: *to reduce GHG emissions by 80% below 2007 levels by 2050*



British Columbia's Green House Gas Reduction Targets Act has directed that municipalities in the province reach an 80% reduction in their overall share of GHG emissions from 2007 levels, by the year 2050 with an interim milestone of 33% reduction (from 2007 levels) by the year 2021. As part of its efforts to meet these targets, the City of Surrey has undertaken a detailed study of its current and projected energy use and emissions portfolio with the help of consultants from HB Lanarc Golder to produce a Community Energy and Emissions Plan, or CEEP. The 'Surrey Sensitive Infill' project provided a unique opportunity to evaluate the degree to which community planning strategies in the study area could contribute to these reduction efforts on the ground. The study area is in many ways representative of the wider community and can serve as an appropriate case study for the city as a whole, as shown in Table One:

Indicator	Total Study Area Average	Surrey Average
Housing Split: Single / Townhouse / Low rise/ High rise	88 / 9 / 3/ 0	67 / 17 / 14 / 2
Avg Yr of Construction	1987	1986
Building Performance - Avg Energy Intensity (GJ/M2)	0.63	0.63
Distance To Rapid Transit (km)	4.8	8.0
Average Distance to regional "CBD" (km)	14.8	15.6
Average Population Under 16 (%)	24%	23%
Housing Mix (0 = homog, 1= heterog)	0.09	0.15
Avg Daily Transit Service Hours	3.0	3.2
Avg Pop Density (Gross DU/H)	8.6	5.2
Intersections per Road KM	2.5	2.7
Ratio of Cycle Routes to Roads	0.27	0.25
Average Vehicles Per Household	1.50	1.50
Land Use Mix (Workers:Jobs)	0.20	0.18
Avg Daily Distance Driven (VKT - km/hh)	55.12	60.40
Avg Daily Transit Ride (PKT - km/hh)	12.19	11.95
Avg Prsnl Auto GHGs (tCO2e/yr/pop)	1.70	1.90
Avg Public Trans GHGs (tCO2e/yr/pop)	0.04	0.04
Avg Total Transpo Emissions per Capita (tCO2e/yr/pop)	1.75	1.94
Avg Buildings GHGs per Capita	1.81	1.83
Avg Total GHGs per Capita (t/CO2e/yr/pop)	3.6	3.8
Avg GHGs Per Resident& Employee (tCO2e/yr/pop+emp)	2.65	1.39

The consensus on changes to the land use pattern, building form, transportation, and infrastructure of the area culminated in a considerable reduction of the GHGs compared to the current projections based on a status-quo development pattern scenario (Table 2). The ‘infill’ changes to urban form and consequent transportation mode split is projected to result in a 60% reduction from the transportation related GHGs and a 53% reduction from the building stock’s share of the overall emissions, resulting in a 57% total reduction of emissions by 2060. This result is considerably higher than the 44% reductions based on current projections.

Table Two shows the modelled per capita greenhouse gas emissions reductions from 2011 levels for both current study area projections and the sensitive infill projections derived from the charrette.

Table 2 <i>adapted from HB Lanarc Golder</i>	Study Area Base Year (2011)	Study Area Current Projections 2040	Study Area Sensitive Infill 2060
Buildings	1.8	1.2 (-33%)	<b>.87 (-53%)</b>
Transportation	1.75	0.77 (-56%)	<b>0.7 (-60%)</b>
Total	3.62	2.01 (-44%)	<b>1.57 (-57%)</b>
Per Resident & Per Employee	2.65	2.10 (-21%)	<b>1.44 (-46%)</b>

The Charrette’s design intervention outperforms current 2040 projections substantially. The charrette-generated proposal also outperforms the previously considered Community Wide Assertive Scenario, getting to the provincially suggested -33% milestone by 2025, which is ten years earlier than the community wide projections assumed in the CEEP project.

Table Three shows the projected year to achieve the minus 33 percent per capita greenhouse gas emissions target.

Table 3: -33% Per Capita Reduction Milestone <i>adapted from HB Lanarc Golder</i>	
Community Wide Current Projections	achieved by 2035
Community Wide Assertive Scenario	achieved by 2030
Sensitive Infill Study Area	<b>achieved by 2025</b>

A detailed breakdown of the changes in the urban pattern and the resulting emissions portfolio can be found in Appendix 2.



## Conclusion:

The Surrey Sensitive Infill Charrette demonstrated how deliberate changes to the land use and development patterns on the ground could contribute to the overall increase in energy and emissions performance of the community. This more integrated approach towards shaping complex building blocks of a community (housing, mobility, energy and green infrastructure and economy) resulted in more aggressive GHG reduction levels. Results were even higher than the sustainable approaches put forward under the Surrey's Community Energy and Emissions Plan (CEEP) targets. This highlights the value of looking at neighbourhoods street by street and parcel by parcel and building type by building type, in order to come up with a practical and evolutionary strategy for reaching GHG reduction goals, and at the same time resulting in a more vibrant urban environment. Complex systems like cities need deeply collaborative processes of achieving energy goals, with many parties at the table. Collaboration between interested parties and individuals who understand the relationships between transportation, building codes, zoning restrictions, energy system design, stream habitat and recreational assets, and how they all congeal in an efficient and sustainable city system, are integral to Surrey's drive for a more vibrant and sustainable future.

If the types of long term changes that are anticipated and illustrated in this charrette are realized, the following benefits may result:

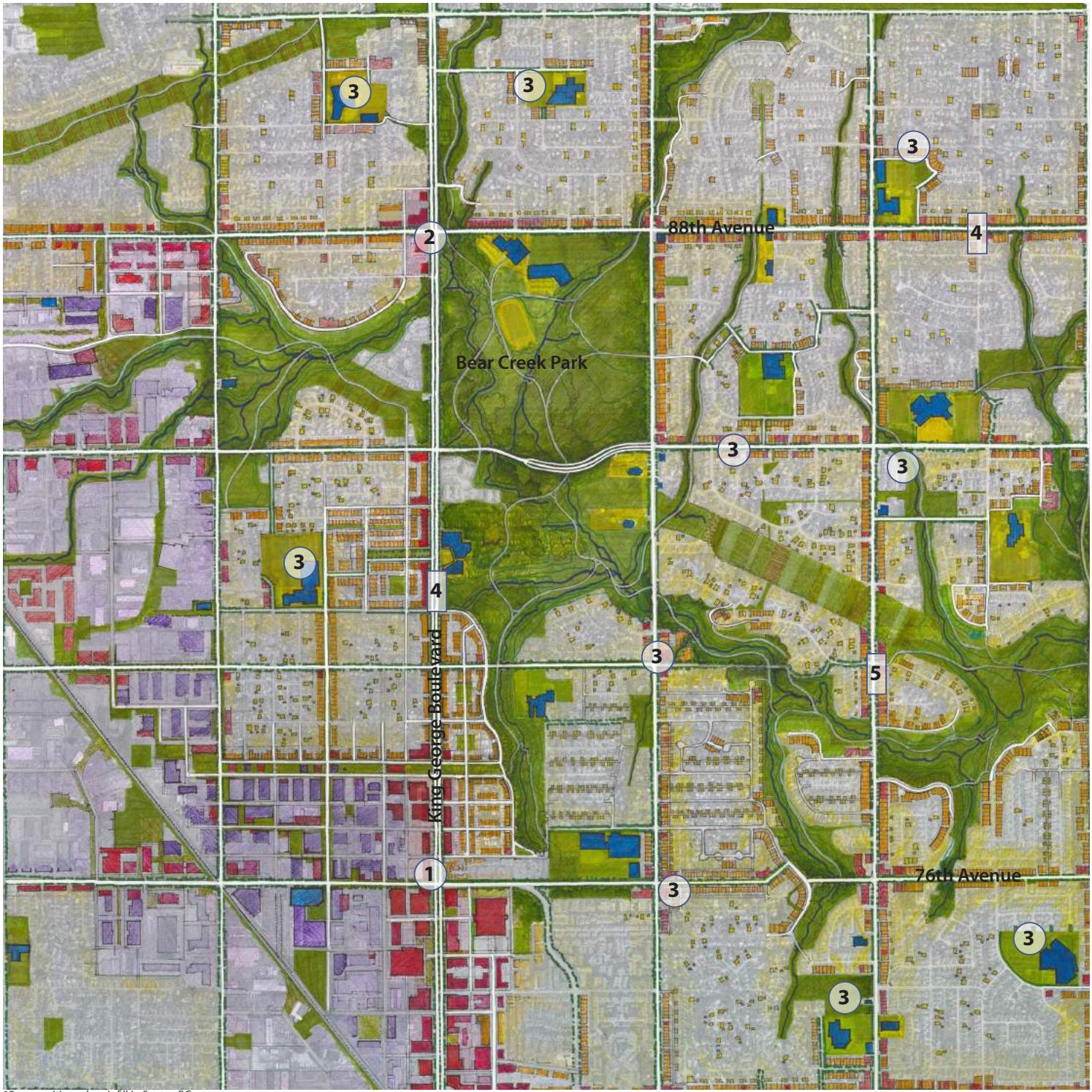
- Increased population
- Greater mix of housing types
- Increased jobs
- Lower greenhouse gas emissions
- Increased greenspace
- Higher mobility connectivity
- Decreased kilometres driven per vehicle
- Increased cycling and walking

## Sources:

*Community Energy and Emission Profile. HB Lanarc Consultant Report, Surrey: City of Surrey, 2011.*

*Surrey Sensitive Infill Energy + Emission Analysis. HB Lanarc Consultant Report for the Design Center for Sustainability, Surrey: City of Surrey, 2012.*

*Condon, Patrick M.; Khany Sam, M. Surrey Sensitive Infill Foundational Research Bulletin: "Speculation on expansion of the district energy system into Surrey's suburban fabric through sensitive in-fill". UBC SALA Design Center for Sustainability, July 2011.*





## Sensitive Urban Infill Concept Plan



### THE MAJOR MOVES

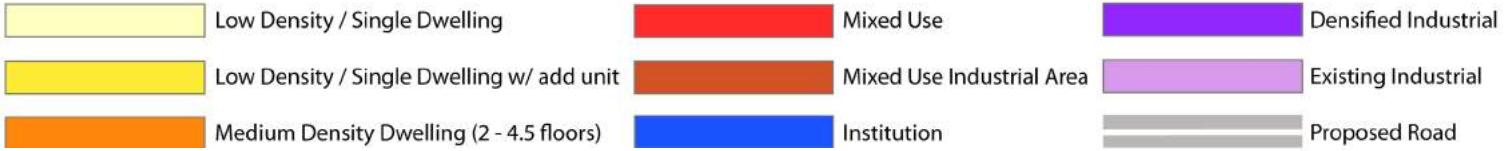
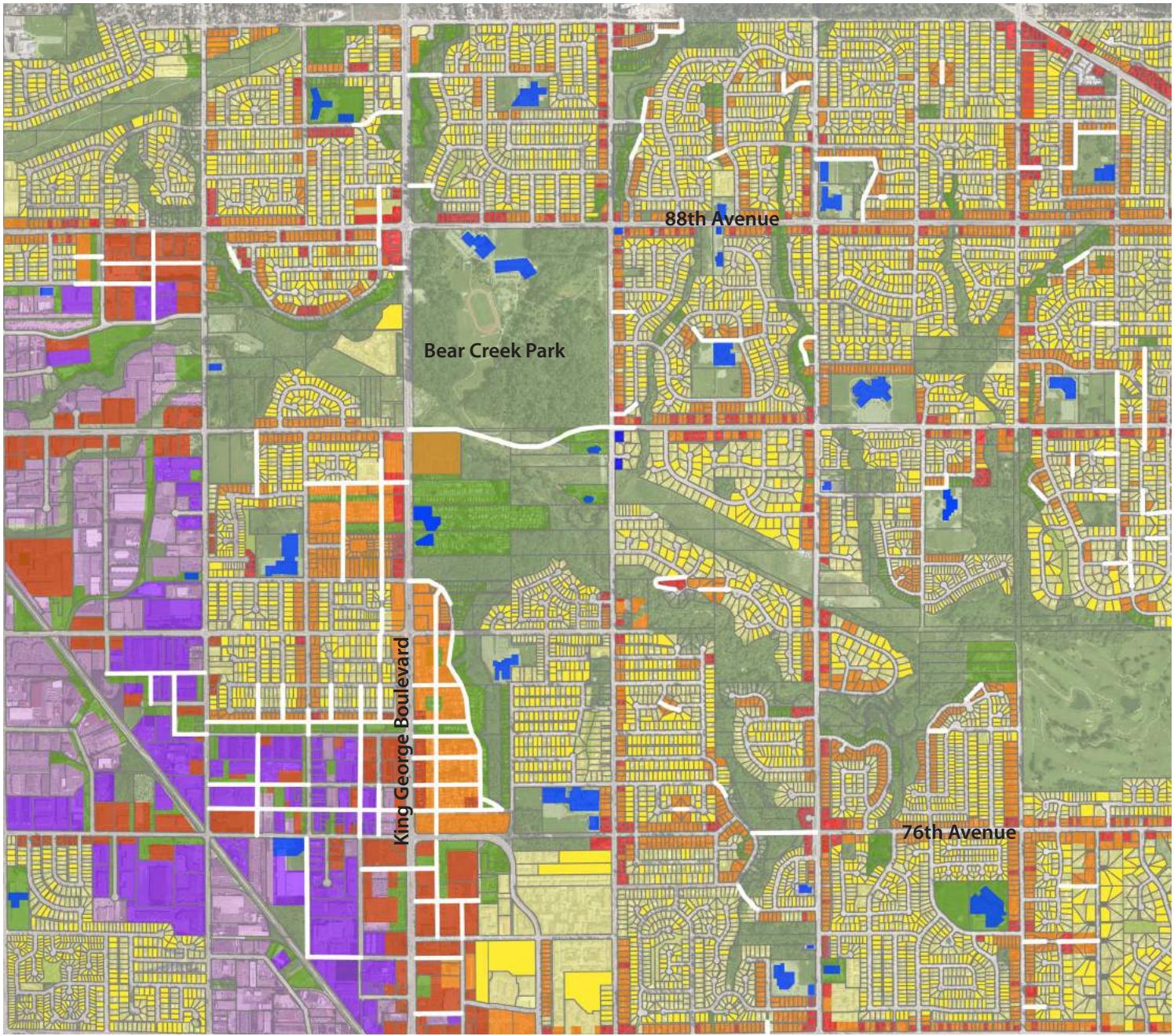
The final concept plan for Sensitive Urban Infill paints a picture of new urban form and transportation patterns that support more livable, walkable, and sustainable neighbourhoods. Areas in grey are shown as is, anticipating little change. Buildings that are colored are either new construction or substantial remodeling of existing structures. New housing and work opportunities locate within a hierarchy of Villages or along Corridors:

- 1 Transit Villages (page 18)
- 2 Urban Villages (page 20)
- 3 Neighbourhood Villages (page 22)
- 4 Transit Corridors (page 24)
- 5 Neighbourhood Corridors (page 24)

New streets (white) create better connectivity for all modes of travel, while new green spaces and agricultural opportunities enhance livability.

### LEGEND

- Mixed Use Buildings
- Attached Residential Buildings
- Detached / Semi-Detached Residential Buildings
- Civic Buildings
- Industrial Buildings
- Green Space



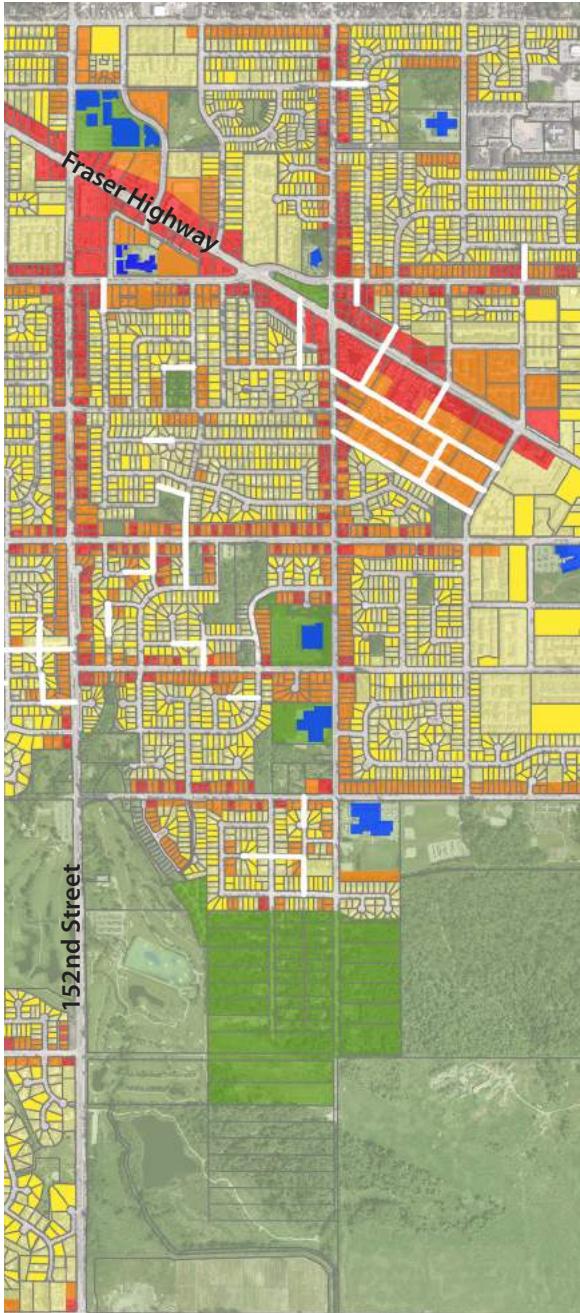


image credit: Dale Lewis

## Sensitive Urban Infill Indicator Measurement MEASURING CHANGE

The plan generated at the charrette was converted to a geographic information systems (GIS) based plan for ease of calculation and future utility. Results are shown below.



Indicator	Current (2011)	Sensitive Infill (2061)
Population	76,495	161,790
Jobs	27,940	55,140
Jobs : worker ratio	.2	.2
Building GHGs (per capita) tonnes CO2e/yr/pop	1.81	0.70 (-53%)
Transportation GHGs (per capita) tonnes CO2e/yr/pop	1.75	0.87 (-60%)
Average GHGs (per capita)	3.6	1.57 (-57%)
Site Area (ha)	2628	2628
Area of Streets (ha)	492	541
Greenspace (ha)	644	738
Commercial Space (ha)	114	included in mixed use
Mixed Use - Commercial/Residential (ha)	0	75
Mixed Use - Industrial/Commerical/Residential (ha)	0	60
Industrial Space (ha)	216	161
Dwelling Units	24600	53200
Gross Residential Density (pph)	29	61
Land use diversity (Simpson's diversity index)	.72	.75
Housing diversity (Simpson's diversity index)	.28	.77
Intersections per road km	2.5	5.1
% dwellings within 5 mins of commercial space	31	100
Parkspace (ha) per 1000 residents	8	4.5

## HOME: Living in Sensitive Urban Infill

The study district is complex in a positive way. It contains a rich and diverse inventory of homes which are, in many cases, being adapted to new uses. But there are problems. Affordable housing options are still limited and some would say that existing planning bylaws can impede the larger affordable and accessible housing objectives of the City of Surrey Sustainability Charter. This project provided an opportunity for participants to suggest changes to city actions that could remove barriers to housing accessibility, affordability and equity, while ensuring that these districts continue as attractive and welcoming places to live.

The key strategy? Make this large city district more walkable and diverse. The study area contains two major arterials, King George Boulevard and Fraser Highway, proposed to be the locations for the region's first surface light rail transit system. The collaborators strongly agreed that, as much as possible, these regionally significant corridors should be reinforced with thousands of new and reasonably affordable housing units, and that the many commercial services necessary to support them be located in the same buildings or nearby. These corridors are each many kilometers long. If even the first facing parcels were developed and redeveloped with low and mid rise apartments then many thousands of new units could be supplied. Four to six story wood frame construction would be the most affordable and sustainable building type, with taller buildings as an appropriate option around light rail stops at major street intersections. Fortunately, most of the parcels along these highways are relatively large and are at a point in their history when they can and should be re-developed. The mobile homes on the east side of King George Boulevard at 78th present a sensitive issue, as the lands are privately owned and proposals for conversion of these lands are highly likely with the advent of the light rail project. The City may take this time to plan policies to promote mutually advantageous relocation of existing residents.

Related to the strategy for King George and Fraser Highway was a similar but customized strategy for the minor arterials in the district. Surrey arterials are arranged in an even grid, with arterial streets located on even half mile increments, placing them a maximum five minute walk from all homes. All of the buses that serve the district travel these arterials, meaning that existing and potential bus routes are similarly close at hand. Unfortunately large parts of the study area now lack commercial services within walking distance, and, at the same time, do not have a diversity of affordable house types to accommodate the district's many different family types and income levels. The team considered many potential ways to improve this situation. Ultimately they recommended that parcels facing the arterials, typically served by rear lanes, be subject to new zoning allowances. These new allowances would allow

for zero lot line construction, an increased allowable floor surface ratio (FSR) up to 1.5, and a relaxation of prohibitions on commercial activity within these parcels. Over time it was anticipated that local residents would gradually take advantage of these changes by adapting and expanding these buildings to capitalize on new options, adding neighbourhood scale commercial enterprises and secondary rental uses to the property.

But what about parcels not on the arterials? This residential fabric is already being slowly transformed, as new family arrangements and the higher than average family size for this district have produced a 15% increase in population over the last three decades. With no further changes to policy it is likely that this trend will continue for some time. However, it was the opinion of the team that judicious policy changes could be proposed to increase housing diversity and affordability options in this interior residential fabric. The least disruptive next step would be allowing more than one rental unit on a parcel. Another step would be to allow for the stratification of units on the parcel, permitting three or more strata units within one building. Both of these options should be done within building types compatible with surrounding development.

Finally and importantly, the Home Team was asked to suggest ways that the study area's very special sense of place could be protected and enhanced. Making streets more walkable and thus more social is the key planning strategy. But in addition to this the team felt it important to ensure that cultural institutions (neighbourhood schools in particular) were understood as the centre pieces of neighbourhood identity, that opportunities to emphasize things of cultural significance were captured in art or memorials, and that the special qualities of the landscape were revealed both by opening up "windows" to the internal landscape of the Bear Creek riparian system, and the external views of the mountains to the north and Boundary Bay and the San Juan Islands to the south.



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David Sadler  
Erin Schultz  
Kelsey Swanson  
James Tuer  
Lisa White*

In the following four sections of HOME, GO, WORK, GREEN, you will find more detailed recommendations provided in a format which offers clear action items the City may choose to undertake. First the original OBJECTIVE, developed from existing City of Surrey Policy and endorsed at Workshop One, is stated. Then, STRATEGIES discovered by the charrette team that might achieve that objective are listed below. ACTIONS AND POLICIES that support each strategy are then listed in table format. The goal is to create a “recipe card” for City of Surrey staff to follow in their efforts to achieve Sensitive Urban Infill.

## HOME Objective One

Encourage the development of higher density, mixed use, compact and walkable neighbourhoods, with easy access to transportation, local shopping, services, markets, and community facilities, while respecting local character.

### Strategies & Actions

Strategy One:

**TRANSIT VILLAGES:** Locate the highest density at intersections of frequent transit networks.

Supporting Actions & Policies:	
1. Define Frequent Transit Village areas in the next Official Community Plan (OCP).	NEW POLICY for the DISTRICT scale provided by PLANNING Department.
2. Conduct a study on appropriate lot consolidation strategies for re-development at major arterial intersections.	NEW STUDY for the PARCEL scale provided by the PLANNING Department
3. Designate highest density within an 800 metre walking distance of Transit Stations. This density can include some high rise towers.	NEW ZONING for the DISTRICT scale provided by the PLANNING department
4. Develop secondary plans for Transit Villages, called “infill Transit Village development areas”	NEW NEIGHBOURHOOD CONCEPT PLAN for the DISTRICT scale provided by the PLANNING department

### *Three Village Scales: Transit, Urban and Neighbourhood.*

The City of Surrey is experiencing increasing development pressure and running out of greenfield areas on which to build. Simultaneously, there is a desire to increase the vibrancy and livability of existing suburban neighbourhoods within the City. The charrette team's challenge was to find ways to increase the density and accessibility of existing neighbourhoods without losing their current character. In order to do this, the team targeted three levels of density in key nodes: Transit Villages, Urban Villages, and Neighbourhood Villages.



Transit Villages have the highest level of density and locate at intersections of frequent transit corridors. Development includes some high-rise towers and mixed-use commercial/residential buildings.



*image credit: Daniel Roehr*

#### **Transit Villages**

Transit villages are high density nodes along major arterials such as King George Boulevard (above), within 800 m of frequent transit stations. These areas will provide major commercial and job spaces, as well as high density housing, for the entire community.

## HOME Objective One (continued)

Encourage the development of higher density, mixed use, compact and walkable neighbourhoods, with easy access to transportation, local shopping, services, markets, and community facilities, while respecting local character.

### Strategies & Actions

Strategy Two:

**URBAN VILLAGES:** Locate major developments on designated 'Urban Villages' at the intersection of major corridors.

Supporting Actions & Policies:	
1. Define Urban Village areas in the OCP.	NEW OFFICIAL COMMUNITY PLAN policy at the DISTRICT scale provided by the PLANNING department
2. Develop secondary plans for these emerging centers, called 'infill Urban Village development areas'.	NEW NEIGHBOURHOOD CONCEPT PLAN at the DISTRICT scale provided by the PLANNING department

### Three Village Scales: Transit, Urban and Neighbourhood.

Urban Villages are smaller in scale than the Transit Villages. They occupy about 6-8 blocks and locate at major intersections, providing some retail, office, and community services close to residential areas. The intention of the Urban Village is to provide an intermediate scale of clustered services accessible to surrounding residents within a 10-15 minute walk.



#### Urban Village Concept at Fraser Highway and 152nd Street.

The Urban Village may have one or two mid-rise towers (up to 14 stories) to help anchor the village. The rest of the buildings will be low-rise and mid-rise mixed use buildings with opportunities for retail and office spaces. The new villages will maximize energy efficiency and incorporate public open spaces, street trees, and green roofs in their design.

## HOME Objective One (continued)

Encourage the development of higher density, mixed use, compact and walkable neighbourhoods, with easy access to transportation, local shopping, services, markets, and community facilities, while respecting local character.

### Strategies & Actions

Strategy Three:

**NEIGHBOURHOOD VILLAGES:** Develop neighbourhood gathering places around school grounds. The focus of these villages is to serve as Community Learning Centres for the immediate neighbourhood.

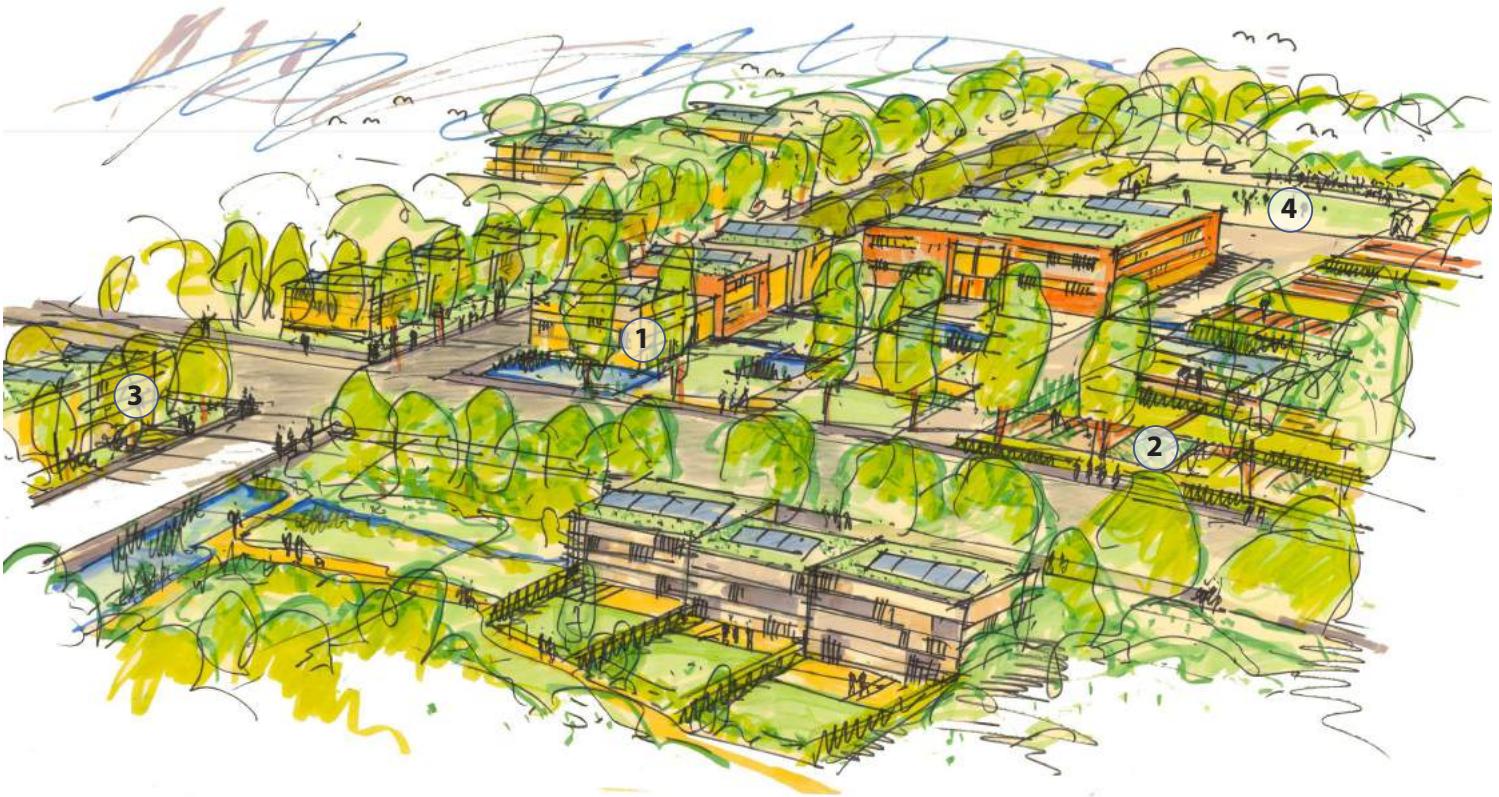
Supporting Actions & Policies:	
1. Develop specific policy around Neighbourhood Villages in order to expand uses within and around school sites, such as sharing of spaces between different institutions and groups.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
2. Create partnerships with Surrey Schools regarding expansion of uses within school lands.	NEW PARTNERSHIP at the DISTRICT Scale provided by the PLANNING and PARKS departments
3. Strategically purchase houses around schools for accommodating cultural activities, creating inclusive environments for all residents.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
4. Create specific design guidelines for these areas.	NEW DESIGN GUIDELINES at the DISTRICT scale provided by the PLANNING department

### *Three Village Scales: Transit, Urban and Neighbourhood.*

At the smallest scale, neighbourhood school sites provide key opportunities for creating small clusters of services for nearby residents. The resulting Neighbourhood Villages provide localized services and amenities, such as childcare facilities and local parks, within a 5 minute walk of surrounding residents.



In sum the three village scales add density and vibrancy to existing neighbourhoods by focusing additional development in appropriately scaled clusters throughout the study site.



*image credit: Daniel Roehr*

#### **Neighbourhood Village**

Neighbourhood Villages locate within and adjacent to existing school sites (large orange building in centre), providing local services to the immediate residential neighbourhoods. There will be day care (1), community gardens (2), grocery stores (3) and recreational space (4) in these areas

## HOME Objective Two

Encourage population and employment density along transit corridors.

### Strategies & Actions

Strategy One:

**FREQUENT TRANSIT CORRIDOR INFILL:** Encourage mixed-use development along frequent transit corridors, with greatest intensity at major intersections.

Supporting Actions & Policies:	
1. Define frequent Transit Development Corridors in the OCP.	NEW OFFICIAL COMMUNITY PLAN policy at the DISTRICT scale provided by the PLANNING department
2. Develop secondary plans, in connection with infill Transit Village development areas, for these corridors.	NEW NEIGHBOURHOOD CONCEPT PLAN at the DISTRICT scale provided by the PLANNING department
3. Conduct a study on appropriate lot consolidation strategies for re-development along transit corridors.	NEW STUDY at the PARCEL scale provided by the PLANNING department
4. Encourage infill strategies that respect the existing rhythm and character of the street, where appropriate.	NEW DESIGN GUIDELINES at the PARCEL scale provided by the PLANNING department

Strategy Two:

**NEIGHBOURHOOD CORRIDOR INFILL:** Allow for new uses on streets along neighbourhood “flex” corridors

Supporting Actions & Policies:	
1. Develop a policy for arterial road densification	NEW ZONING at the DISTRICT scale provided by the PLANNING department
2. Establish ‘Flex’ zoning for street level activities on corridors.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
3. Conduct a study on appropriate lot consolidation strategies for re-development along Neighbourhood Corridors.	NEW STUDY at the PARCEL scale provided by the PLANNING department
4. Encourage infill strategies that respects existing rhythm and character.	NEW DESIGN GUIDELINES at the PARCEL scale provided by the PLANNING department

## Communities on the Corridors

The City of Surrey's network of arterials and corridors provide an opportunity to accommodate additional uses and densities. The charrette team identified frequent transit corridors where additional density will support transit investments. Remaining residential corridors can benefit from smaller scale infill strategies. Small scale strategies include flexible space for live-work arrangements and ground-oriented commercial activity, on small scale lot consolidations.

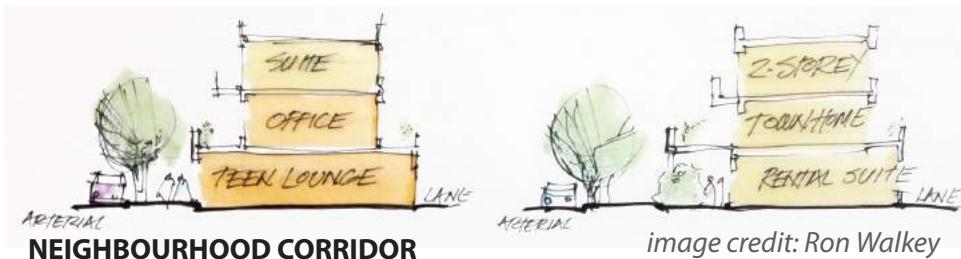


### Example

plazas with 'iconic' elements  
announcing the corridor.



image credit: James Tuer



NEIGHBOURHOOD CORRIDOR

image credit: Ron Walkey

### Transit and Neighbourhood Corridors

Corridors along arterials can accommodate moderate levels of density through flexible configuration of 2 to 6 adjacent lots. These areas can accommodate much of the new residential and work spaces in low rise and townhouse formats.

## HOME Objective Three

Allow for increased density through gentle and gradual infill of mixed affordable and accessible housing types and adaptations, appropriate to a rapidly changing ethnic, income, family type and age demographic.

### Strategies & Actions

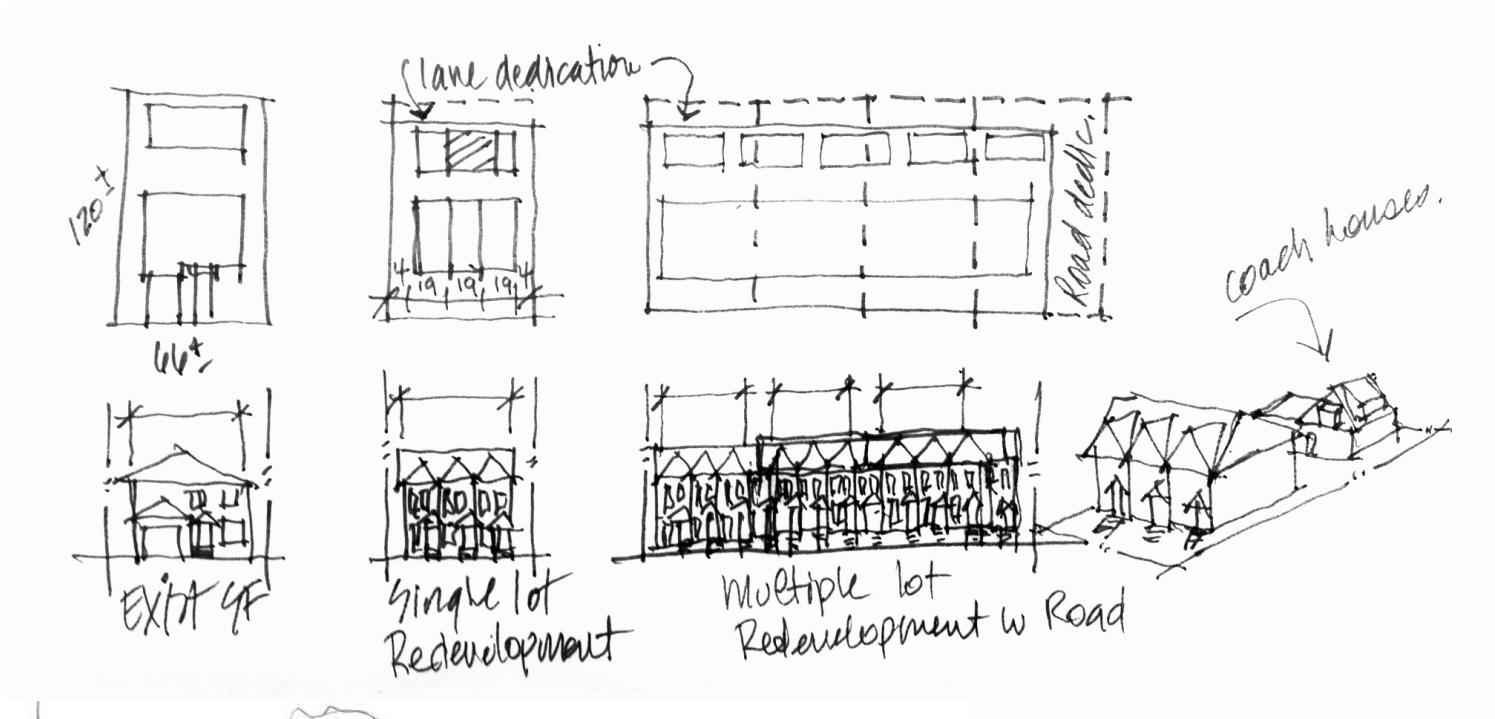
Strategy One:

**SINGLE FAMILY INFILL:** Allow for a range of additional dwellings on single family lots to allow for gentle densification in existing neighbourhoods.

Supporting Actions & Policies:	
1. Update Surrey's Infill Policy to allow for multi-family housing and coach houses, while addressing current impediments such as the 'fit in' requirement.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department
2. Create new flexible design guidelines for infill strategies, allowing for new and exciting buildings and design options.	NEW DESIGN GUIDELINES at the DISTRICT scale provided by the PLANNING department
3. Ensure new infill meets emergency access requirements.	NEW BYLAW at the PARCEL scale provided by the PLANNING department
4. Amend policies around lot consolidation to allow a smaller number of lots to come together than presently allowed. For example, develop a densification formula on escalating scale based on land assembly: <ol style="list-style-type: none"> <li>a. One lot can become a quadriplex</li> <li>b. Two lots can become townhouses or rowhouses</li> <li>c. Only allow apartments adjacent to identified transit corridors</li> </ol>	UPDATE POLICY at the PARCEL scale provided by the PLANNING department
5. Develop criteria for identifying infill areas based on neighbourhood health characteristics such as housing age, tenure, and the quality of existing housing stock.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
6. Define setback, height, basic envelope for new developments.	UPDATE DESIGN GUIDELINES at the PARCEL scale provided by the PLANNING department

## Gentle Density

The suburban residential fabric in the study area, with the predominant single detached bungalow, has undergone a shift in recent years. It now accommodates new family structures and living arrangements. Diverse ethnic and cultural groups, as well as new economic realities, have brought multi-family and multi-generational living arrangements to this area. The charrette team capitalized on this organic transformation, allowing for new residential buildings through gentle and “hidden” forms of density.



### Single family infill in suburban cul-de-sac

Greater flexibility in zoning and tenure arrangements can allow for gradual growth of the suburban cul-du-sacs. Additional units are built onto existing residential units. A denser tree canopy and more coherent street treatment can unify the diversity of housing types.

image credit: Ron Walkey

## HOME Objective Three (continued)

Allow for increased density through gentle and gradual infill of a blend of affordable and accessible housing types and adaptations, appropriate to a rapidly changing ethnic, income, family type and age demographic.

### Strategies & Actions

Strategy Two:

**RIPARIAN INFILL:** Allow for densification adjacent to protected riparian areas.

Supporting Actions & Policies:	
1. Develop density bonus policy and coach house design guidelines to support acquiring land adjacent to the riparian corridors.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
2. Create a separate zone in the OCP to designate riparian corridors for density bonusing.	NEW OFFICIAL COMMUNITY PLAN policy at the DISTRICT scale provided by the PLANNING department
3. Include infill development areas along green areas to initiate density bonus and amenity contribution.	NEW ZONING at the DISTRICT scale provided by the PLANNING department

## Riparian Infill

Preservation of the riparian corridors running through much of the study area has left the community with a lasting ecological amenity. This amenity is currently underutilized, with single family neighbourhoods often turning their back to protected stream corridors. The charrette team proposed an innovative approach to capitalize on the recreational possibilities of these corridors. Lots bordering riparian corridors will receive additional density allowances. Development funds generated from this strategy can be used to restore riparian corridors, and in select locations provide public pathways along the corridors for active transportation modes.

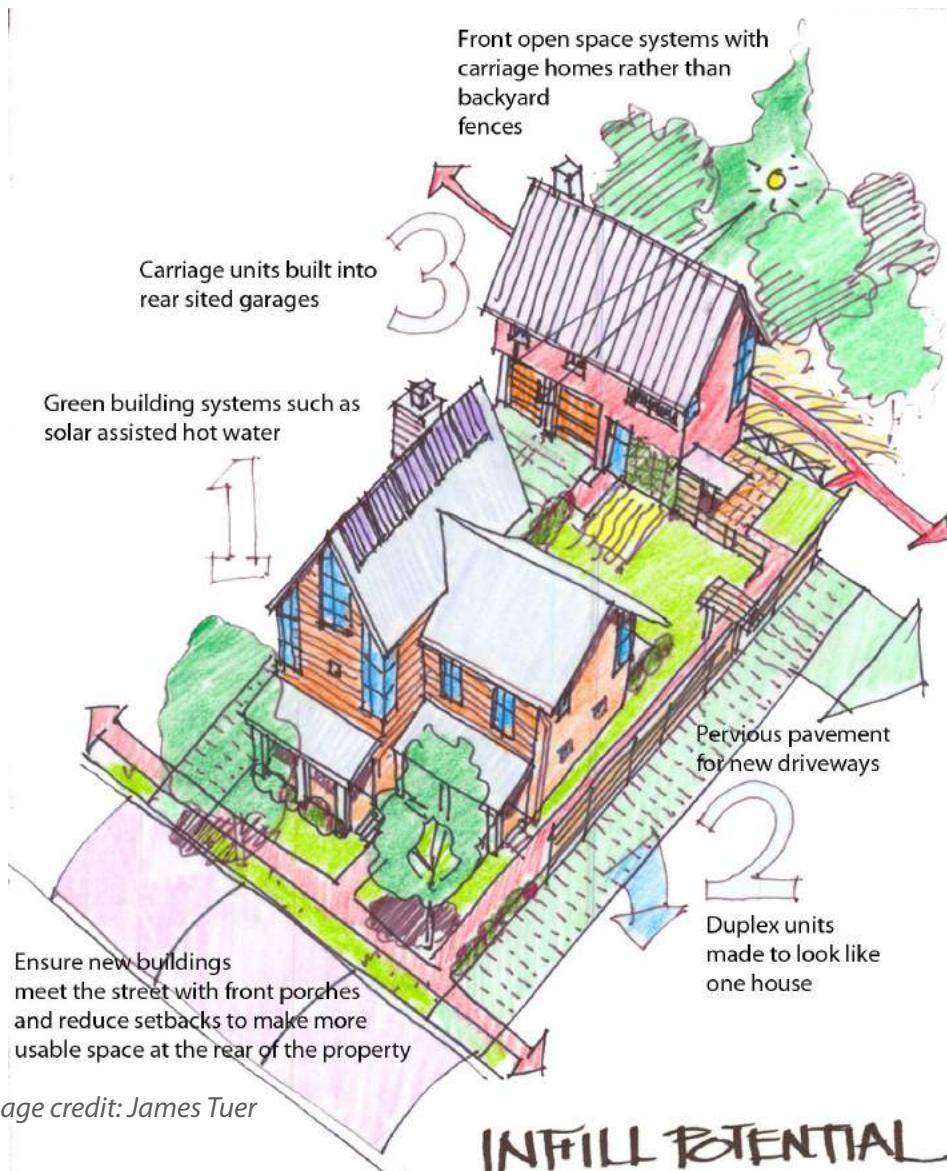


image credit: James Tuer

### Single family infill along riparian corridor

Over time, single detached houses that currently face away from riparian corridors can accommodate up to three dwelling units. A carefully designed duplex unit can sit at the front of the lot (2), making space for a coach house on the lane way (3), facing the riparian corridor. Natural infiltration of ground water is maintained. Paths along the riparian corridor can serve as an active transportation network and a recreational amenity.

## HOME Objective Four

Support a diverse culture from a broad range of ethnic, income and demographic backgrounds.

### Strategies & Actions

Strategy One:

**PROTECT EXISTING DIVERSITY:** Recognize and foster existing centers of culturally distinct economic and cultural activity.

Supporting Actions & Policies:	
1. Develop a policy for the phased relocation and redevelopment of manufactured (mobile) home parks.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
2. Develop policy on use of boarding houses (location criteria, maintenance, performance standards, etc...).	NEW POLICY at the DISTRICT scale provided by the PLANNING department
3. Conduct a study to identify areas of cultural significance.	NEW STUDY at the DISTRICT scale provided by the PLANNING department

Strategy Two:

**DIVERSE HOUSING:** Respond to existing and potential future demands for new forms of flexible housing.

Supporting Actions & Policies:	
1. Create strategy around acceptable forms of large format housing to meet the needs of Multi-family household arrangements.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department
2. Allow for development retrofits in single family homes which allow elderly residents to make modifications to rent out a portion of the home.	UPDATE ZONING at the PARCEL scale provided by the PLANNING department

Strategy Three:

**DIVERSE CULTURE & RECREATION:** Provide for a mix of cultural and recreational opportunities that are appropriate to different ages and cultures.

Supporting Actions & Policies:	
1. Conduct a study on missing cultural and recreational elements within existing neighbourhoods	NEW STUDY at the DISTRICT scale provided by the PLANNING department
2. Amend sign and other by-laws to allow for ethno-cultural expression in culturally distinct areas.	NEW BYLAW at the DISTRICT scale provided by the PLANNING department

## *Diversify the Fabric*

The composition of Surrey's residents in terms of age, ethnicity and income has been changing and will continue to change well into the future. This has brought new and diverse cultural activities, living arrangements, and commercial practices to the area. In turn, the study area's emerging diverse communities require new housing types, appropriate community facilities, and distinct public spaces. The design team encouraged greater flexibility and adaptability in response to these new social realities.



### **Diversity**

This area accommodates a diverse group of residents, requiring unique residential, commercial, and recreational spaces. From entrepreneurial home cooking businesses in bungalows, to dance studios in flexible spaces on the corridors, to a Punjabi market in the industrial lands, this area fosters a variety of life-styles and cultures.

## HOME Objective Five

Promote a sense of identity, inclusion, belonging and safety through design strategies.

### Strategies & Actions

Strategy One:

**RIPARIAN IDENTITY:** Reorient lots to face green spaces, community spaces, streets and pathways.

Supporting Actions & Policies:	
1. Celebrate the shared ecological attributes of this community by encouraging redevelopment to face riparian corridors.	NEW DESIGN GUIDELINES at the DISTRICT scale provided by the PLANNING department
2. Find funding sources for street celebrations and other identity creating events.	NEW POLICY at the DISTRICT scale provided by the ECONOMIC DEVELOPMENT department
3. Strategically purchase lots along riparian corridors to allow greater access to these shared community assets.	NEW POLICY at the DISTRICT scale provided by the PLANNING and ECONOMIC DEVELOPMENT departments

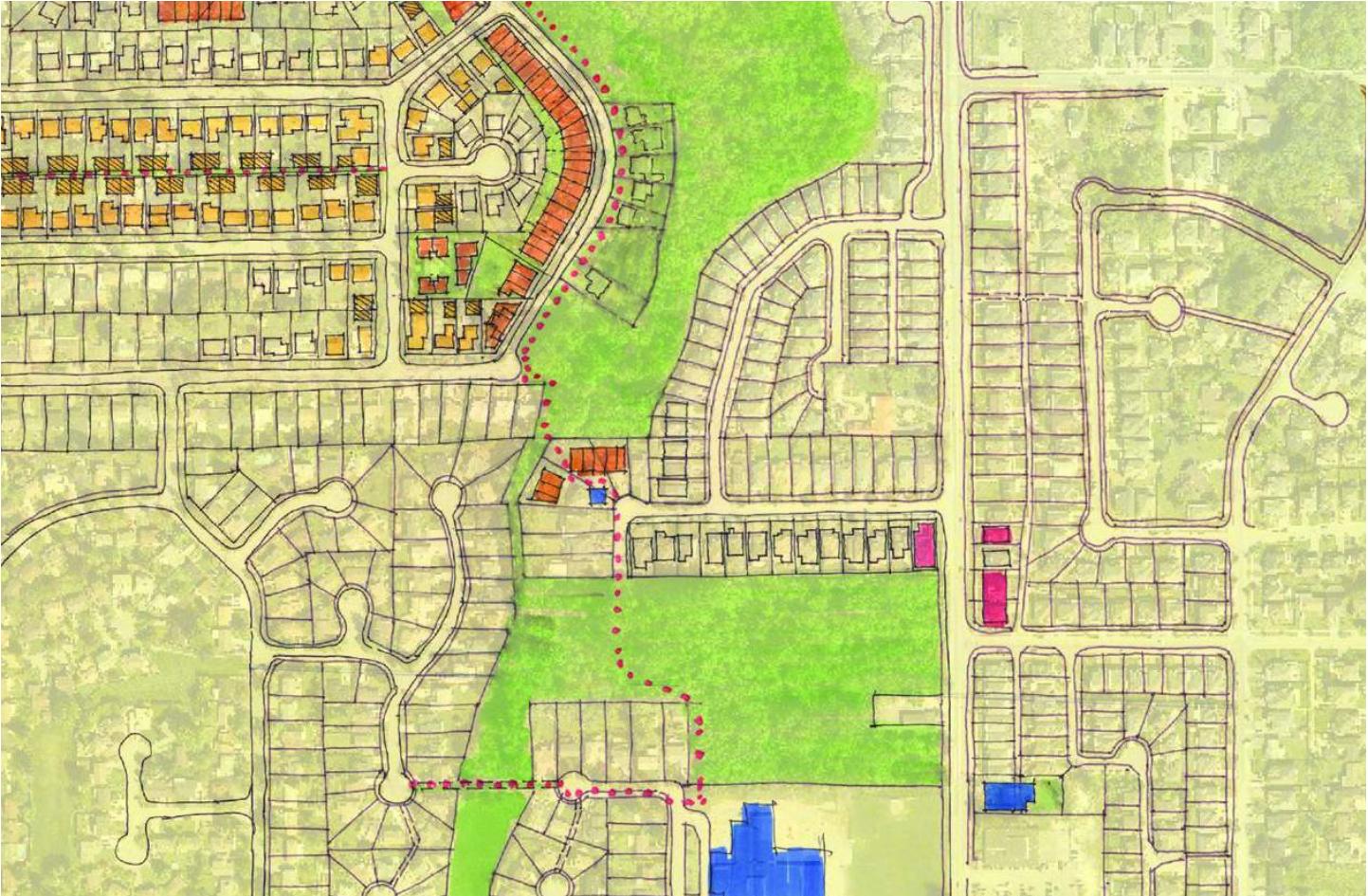
Strategy Two:

**COMMUNITY ENGAGEMENT:** Develop more democratic and inclusive engagement processes.

Supporting Actions & Policies:	
1. Develop OCP policy around neighbourhood engagement processes to allow for greater self determination.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
2. Allow for neighbourhood-led planning processes leading to defined zoning and design guidelines.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
3. Communicate existing and future city policies and programs in multiple languages.	NEW POLICY at the DISTRICT scale provided by the PLANNING and COMMUNICATIONS departments
4. Develop a process for residents to create a higher level vision and design aspirations for identified evolving neighbourhoods.	NEW OFFICIAL COMMUNITY PLAN policy at the DISTRICT scale provided by the PLANNING department

## Face the Green

The study area's unifying element is the network of riparian corridors. The charrette team capitalized on this rich asset by reorienting parcels, blocks, and neighbourhoods to "face the green" systems and create an inclusive and far safer neighbourhood.



*image credit: Jennifer Marshall*

### Face the Green

Gradual reorientation of lots towards the riparian corridors and streams allows for the formation of an interconnected pathway for active transportation and recreational opportunities.

## HOME Objective Six:

Provide centrally available cultural, social, recreational and health facilities and civic amenities that respond to the needs and interests of the City's diverse population, including children, youth, seniors, multi-cultural groups, families, vulnerable populations and those with special needs. Every resident should be within a 5-10 minute walk of one of these facilities.

### Strategies & Actions:

#### Strategy One:

**COMMUNITY LEARNING HUBS:** Co-locate cultural and recreational amenities around Neighbourhood Villages, capitalizing on existing facilities such as schools, religious institutions, community and recreational facilities.

Supporting Actions & Policies:	
1. Allow for a diversity of uses around Neighbourhood Villages and along nearby corridors, including a more flexible permit process for events in commercial and institutional buildings.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department
2. Review practices and policies related to locating facilities in City parks to allow for a variety of community uses.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING and PARKS departments
3. Integrate employment opportunities into Neighbourhood Villages (employment could be located within/on school/community centre sites) to promote higher mixed-use densities, affordable housing and social meeting spaces.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
4. Co-locate parks and community facilities with identified schools, religious institutions or other community gathering places.	NEW ZONING at the DISTRICT scale provided by the PLANNING and PARKS departments
5. Create 'locational criteria' for commercial and childcare uses around schools.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
6. Encourage specific types of meeting spaces, such as coffee shops, restaurants, pubs, etc. to support home based businesses.	NEW POLICY at the DISTRICT scale provided by the PLANNING department

## Community Learning Hubs

Development within and around the new villages and corridors is accompanied by appropriate community facilities and services for each scale. At the Neighbourhood scale, the charrette team focused on community learning opportunities. Community amenities and services at this scale create “Community Learning Hubs” for all ages of the population.



*image credit: Neda Roonia*

### **Community Learning Hubs**

Community Learning Hubs serve as neighbourhood hearts, responding to the growing needs of diverse age groups and cultures in their recreational and educational needs. In the future, co-location of services for seniors, child-care facilities, park space and even family essentials such as grocery stores allows for residents to stay in their neighborhood longer and form lasting connections.

## HOME Objective Seven

Incorporate principles of Universal Design to ensure accessibility to everyone.

### Strategies & Actions

Strategy One:

**ADAPTIVE HOUSING:** Require an adaptable built housing and environment.

Supporting Actions & Policies:	
1. Develop adaptable housing requirements for new types of coach houses, secondary suites and multifamily housing.	NEW DESIGN GUIDELINES at the PARCEL scale provided by the PLANNING department

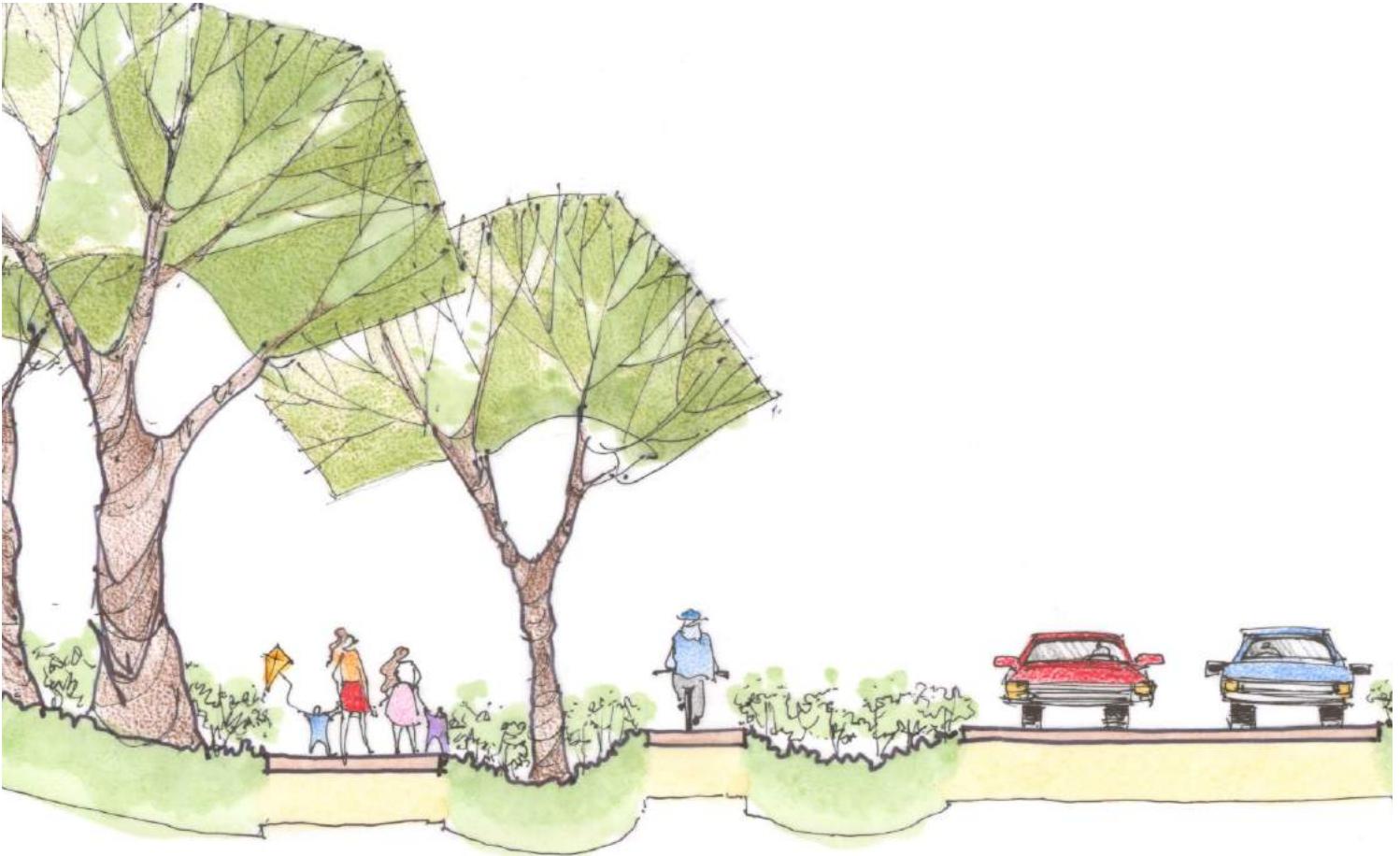
Strategy Two:

**UNIVERSAL PATHWAYS:** Promote passive and active uses along riparian corridors that are universally accessible, fix existing sidewalks, and create new sidewalks to allow for comfortable travel for all residents.

Supporting Actions & Policies:	
1. Complete the sidewalk network within the study site to ensure that mobility devices have the same route choices as all other modes of travel.	UPDATE STREET STANDARDS at the DISTRICT scale provided by the ENGINEERING department
2. Fix existing sidewalks to ensure they are passable in a wheelchair, including adding curb let downs where they do not already exist.	UPDATE STREET STANDARDS at the DISTRICT scale provided by the ENGINEERING department
3. Ensure new pathways include a universally accessible path.	NEW POLICY and STREET STANDARDS at the DISTRICT scale provided by the PLANNING and ENGINEERING departments

## Equal access

The area will become increasingly diverse - an aging population not the least of these changes. This will naturally change the demands on City facilities and services. Universal design strategies for new homes, public buildings, and the public realm will accommodate these shifts.



*image credit: Neda Roonia*

### **Access**

The area will house greater numbers of seniors as well as larger number of families with children. This will require universal accessibility for all ages to buildings, amenities, transportation, and pathways.

## HOME Objective Eight

Enhance neighbourhood distinction and sense of place through design.

### Strategies & Actions

Strategy One:

**CELEBRATE HISTORY:** Allow for historic interpretation of buildings and structures from multiple perspectives and cultures

Supporting Actions & Policies:	
1. Develop historical interpretation materials such as storyboards to include diverse cultures, and emerging identities and histories.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department
2. Add more buildings and parks to the heritage register.	NEW POLICY at the DISTRICT scale provided by the PLANNING department

Strategy Two:

**DIVERSE NEIGHBOURHOODS:** Encourage diversity in neighbourhood and housing design.

Supporting Actions & Policies:	
1. Develop design guidelines that encourage a diversity of housing designs.	UPDATE DESIGN GUIDELINES at the DISTRICT scale provided by the PLANNING department
2. Create new flexible design guidelines for infill strategies, allowing for innovative buildings and design options.	NEW DESIGN GUIDELINES at the DISTRICT scale provided by the PLANNING department
3. Create a coherent public realm guideline, particularly a uniform tree canopy and consistent streetscape, to ensure neighbourhood cohesiveness.	NEW DESIGN GUIDELINES at the DISTRICT scale provided by the PLANNING department

## Celebrate diversity

Surrey's cultural landscape is becoming increasingly diverse. To create a sense of belonging, residents should be empowered to express their unique cultural identities. Strategies to achieve this include an inclusive and open interpretation of heritage preservation, identity creation, residential design, and placemaking. These various interpretations are then brought together through a coherent public realm design.



EXISTING CUL-DE-SAC



INFILL CUL-DE-SAC

### Diverse Housing

New housing types and more flexible design guidelines allow for more individual expression and housing type diversity in residential neighbourhoods (lower image).

*image credit: Ron Walkey*

## HOME Objective Nine

Design for an aesthetically pleasing and high quality public realm, complete with public art.

### Strategies & Actions

Strategy One:

**NEIGHBOURHOOD BEAUTIFICATION:** Facilitate beautification of neighbourhoods.

Supporting Actions & Policies:	
1. Engage immediate neighbourhood residents in beautification and public art projects.	NEW POLICY at the DISTRICT scale provided by the PLANNING and PARKS departments
2. Determine an appropriate development contribution for amenity improvements and neighbourhood beautification.	NEW POLICY at the DISTRICT scale provided by the PLANNING department

Strategy Two:

**PUBLIC ART:** Create public art for all emerging areas.

Supporting Actions & Policies:	
1. Find funding sources and allocate public art funds for emerging Transit, Urban and Neighbourhood Villages, and along Transit Corridors.	NEW POLICY at the DISTRICT scale provided by the PLANNING and ENGINEERING departments

## Beautiful places

As new villages and corridors emerge in this area, a portion of the money generated from these new developments will be used for neighbourhood beautification, civic art installations and public realm enhancement projects. This will increase a sense of community pride for a diverse population.



*image credit: Neda Roonia*

### Beautiful Places

Greater attention to the aesthetics of the new developments in the area, including new public services and facilities, can create a distinct architectural look and feel for the area and promote a greater sense of pride and belonging.

## HOME Objective Ten

Identify, protect, and make publicly accessible as many views as possible – to mountains, to valleys, to riparian areas, to cultural icons.

### Strategies & Actions

Strategy One:

**COMMUNITY VIEWS:** Preserve views of the agricultural valley, Green Timbers, forested ridges, Bear Creek Park, and the Fraser Highway viewpoint to Mount Baker and the North Shore Mountains

Supporting Actions & Policies:	
1. Develop new view corridor policies for identified areas.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
2. Increase views into riparian areas through strategic purchasing of lots, new riparian pathways, and new stream crossings.	NEW POLICY at the DISTRICT scale provided by the PLANNING department

## Protect views

This area has tremendous views to both local and regional natural amenities, such as streams, parks and mountains. New developments will celebrate these views and face these areas. Additional parks and pathways increase access to these amenities for local residents and the wider public.



*image credit: Neda Roonia*

### Views

Developments in this area will face important natural and cultural heritage sites. Public views to areas such as the Bear Creek park, streams and the mountains will be maintained.

## GO: Mobility Networks for Sensitive Urban Infill

The study area has two district wide movement systems, one highly visible, the other hidden. The visible one is the network of arterial streets spaced at even half mile increments. The hidden one is the dendritic (or tree-like) Bear Creek riparian watershed system, a system that reaches into almost every part of the site; however, with the exception of Bear Creek park and a couple of other places in the district, this vast network goes unnoticed and underused. The district wide strategies described in this section have the potential to knit these two systems together to form a truly multi modal and ecologically complete movement system; largely for humans, but also importantly for terrestrial and aquatic creatures.

The first and most important objective for this team was to provide options to the car. Consequently, the function of streets must be re-thought, such that walking, biking, and transit take priority over car use. This means reconsidering street cross-section and intersection designs to ensure safety and comfort for all modes. But a comfortable cross-section doesn't help if the user has no nearby destination worth the trip, and no direct connections to get there. To fix this problem, the integrity of the movement network must be improved, and the land uses served by this street system rethought. Origins must get within walking distance of destinations, and buses must be readily available for longer trips.

In this regard the true untapped resource is the Bear Creek watershed riparian system. This under utilized, inaccessible, and often hidden open space resource has the potential to knit together the community. While generally not appropriate for cars, it is highly suited for walking and biking, and potentially for use by small motorized vehicles such as scooters. Neighbourhoods and community resources that are presently inaccessible to a large number of potential users would be made accessible were this network improved.

Finally, the Go team spent much time discussing the merits and demerits of linking 84th Street across the south end of Bear Creek Park. Ultimately the group felt that our ambition to let people access the district more easily and sustainably was hampered by the rarity of complete east/west connections. Translink has often expressed how difficult they find it to serve this populous district with so few through east/west arterials. Absent the 84th street link, congestion is a fact of life on 88th and 72nd street, the only east/west options in the district. A new parkway link at 84th would greatly improve this situation.



*GO team*

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*Rob Lane*

*Mary-Beth Rondeau*

*Kristin Teide*

*Mary Wong*

## GO Objective One

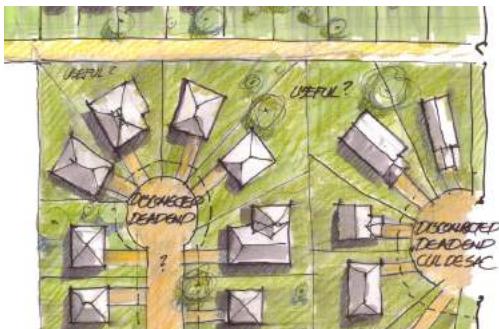
Emphasize alternative options to the car for movement: walking, biking and transit, while accommodating personal mobility devices and motorized wheelchairs for populations with mobility challenges.

### Strategies & Actions

Strategy One:

**Fine Grain Movement System:** Employ actions such as expanding existing lane systems, “venting” cul-de-sacs, and creating pedestrian connections to improve connectivity, especially in the east-west direction.

Supporting Actions & Policies:	
1. Complete the arterial grid: 76th, 80th, 84th, 152nd Streets and King George Boulevard should all be connected through streets.	UPDATE POLICY at the STREET scale provided by the ENGINEERING department
2. “Vent” cul-de-sacs to create permeable residential neighbourhoods to allow for easier access to commercial and/or work areas and community services (diagram below).	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
3. Ensure that future laneway and pedestrian connection corridors are protected during development. Require a lane dedication when lots are re-developed. The lane will help move the driveway from arterial roads and can be used to service houses.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
4. Allow for lot consolidation and increased density to permit redevelopment where a new access route is provided (ex. vented cul-de-sacs and lanes).	NEW POLICY at the DISTRICT scale provided by the PLANNING department
5. In strategic locations, prioritize the acquisition of existing lots to construct a laneway, while selling the remainder of the lot with a built-in increase in density to recover costs.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments



#### Fine grain connections:

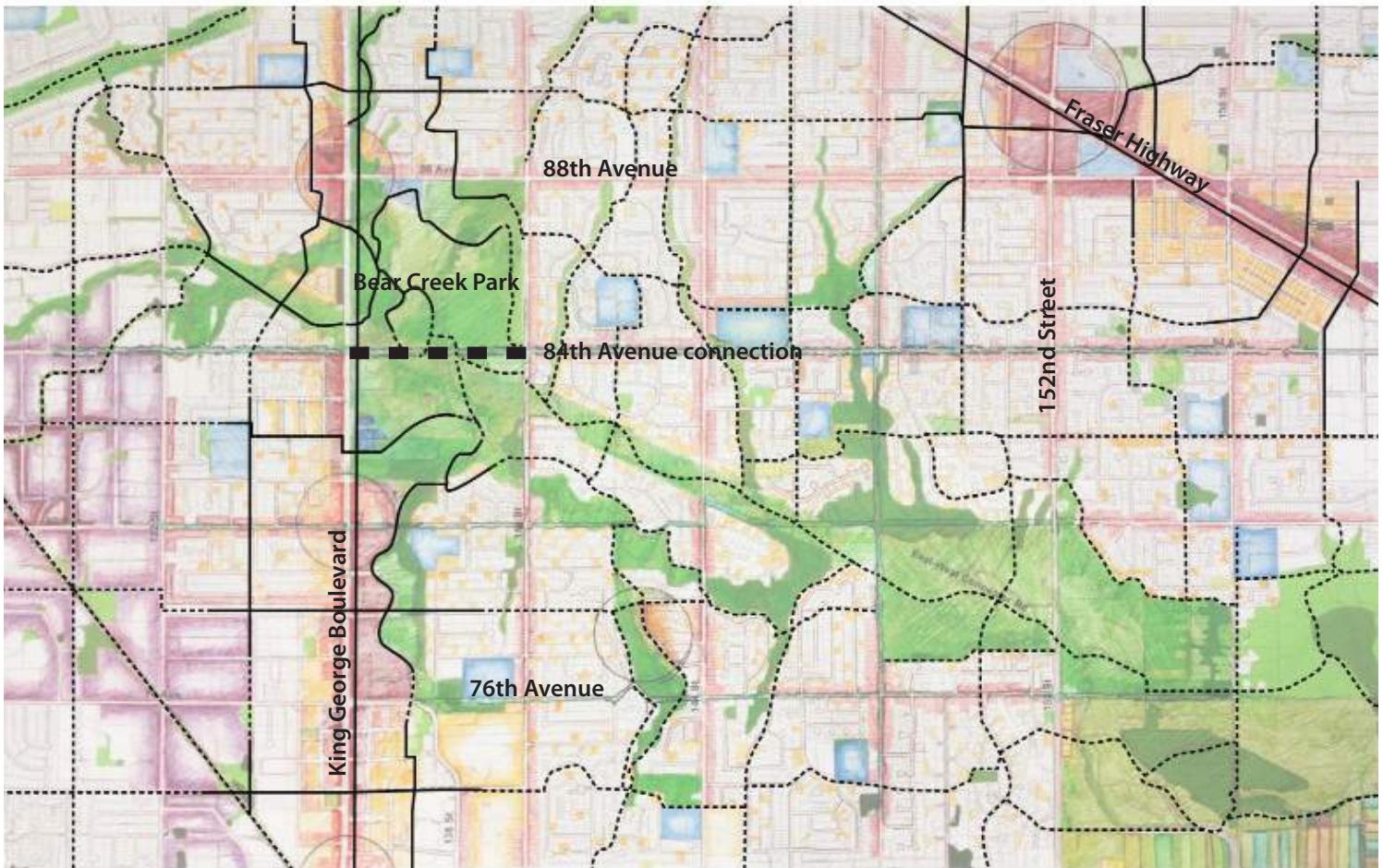
These diagrams show two potential strategies for creating pedestrian and cycling connections within existing residential neighbourhoods:

1. Cul-de-sacs are “vented” as redevelopment occurs.
2. New mid-block connections are created through density bonuses.

image credit: Ron Walkey

## A Community of Paths

A key transportation issue within the study site is the lack of route choices for movement, particularly in the east-west direction. In order to emphasize alternative options to the car, the charrette team prioritized creating more route choices for walking, cycling, and transit.



- Prioritized pedestrian and bike network
- - - - - Pedestrian and bike network

### Alternative Movement Options

This map shows additional alternative movement networks within the study site. These additional paths allow for easier walking and cycling access to neighbourhood destinations.

## GO Objective Two

Facilitate efficient and sustainable options for movement of goods.

Go

### Strategies & Actions

Strategy One:

**TRUCKING CORRIDORS:** Co-locate appropriate businesses where possible, designate truck routes, and create a dedicated right-of-way for truck traffic to facilitate an efficient goods movement system.

Supporting Actions & Policies:	
1. Examine and coordinate uses within industrial parks. Work towards locational efficiencies (i.e. reduce transportation costs of materials by co-locating businesses involved in the manufacturing of specific products).	NEW STUDY at the DISTRICT scale provided by the PLANNING AND ECONOMIC DEVELOPMENT departments
2. Designate some arterials as truck routes.	NEW POLICY at the DISTRICT scale provided by the ENGINEERING department
3. Dedicate a ROW for truck traffic on certain arterials.	UPDATE POLICY at the DISTRICT scale provided by the ENGINEERING department

Strategy Two:

**RAIL CORRIDORS:** Protect and take advantage of the existing rail corridors to facilitate goods movement to and from the neighbourhood. The rail line can also be used for passenger rail to bring employees into the industrial area.

Supporting Actions & Policies:	
1. Ensure new commercial and industrial development incorporates the existing rail line into its design and function.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department
2. Locate a rail line stop for passenger rail in the established industrial area. This line could be used for passengers in the daytime, and freight at night.	NEW POLICY at the DISTRICT scale provided by the ENGINEERING department

## Efficient Goods Movement

The existing road and rail infrastructure play a critical role for the local and regional economy. These networks need to be better integrated for the efficient movement of goods and services within a low-carbon, sustainable future economy. The charrette team emphasized better use of the street network and the existing rail line to link major production sites with appropriate destinations. .

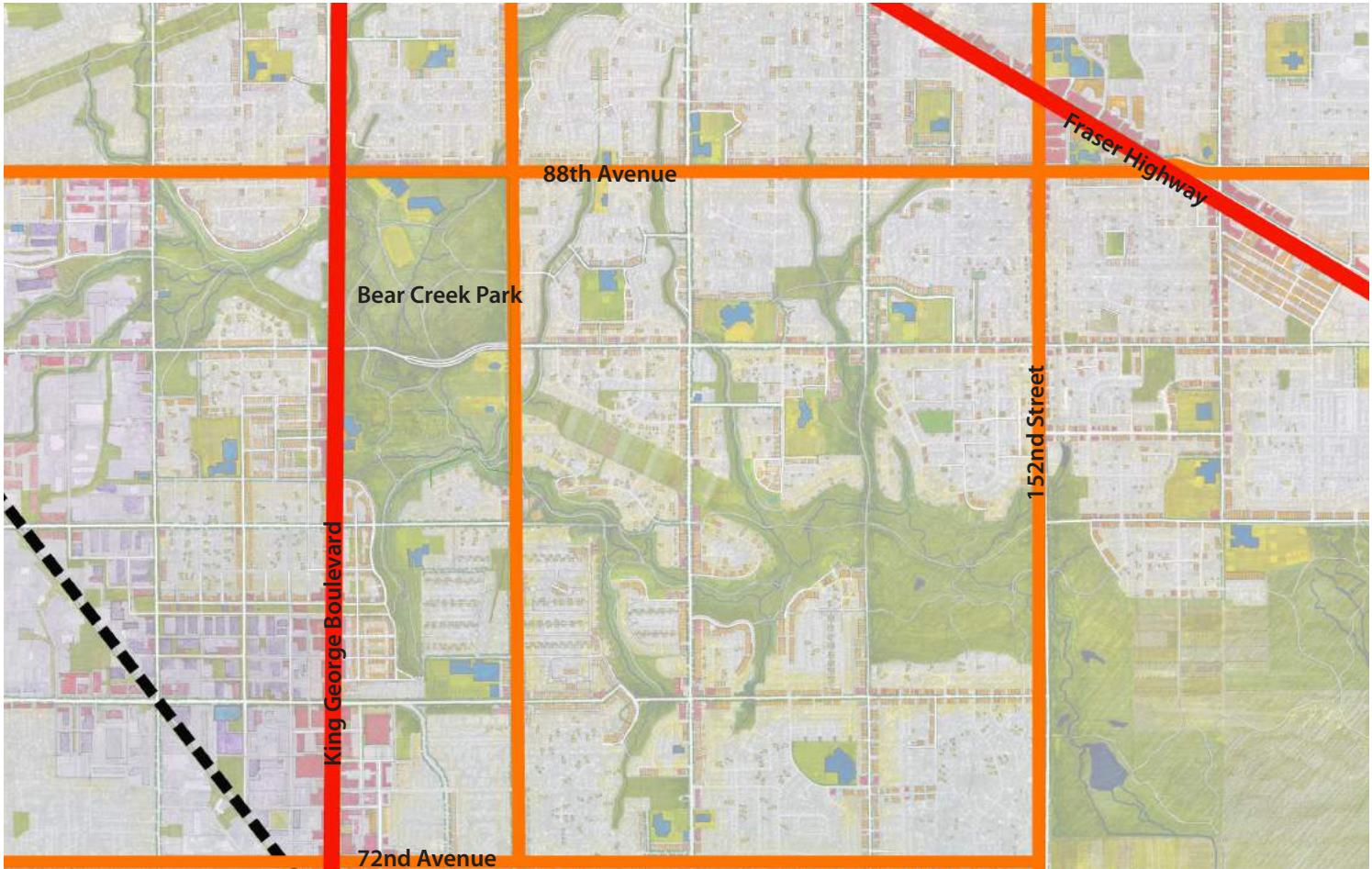


image credit: Mary Wong

-  Major Truck Route
-  Secondary Truck Route
-  Rail

### Sustainable Goods Movement

This map shows major goods movement routes within the study area.

## GO Objective Three

Connect to major local, city wide and regional destinations through an interconnected local street and pathway system that accommodates all modes of travel, while prioritizing transit and walking over car trips.

### Strategies & Actions

Strategy One:

FREQUENT TRANSIT: Designate major frequent transit corridors.

Supporting Actions & Policies:	
1. Support and encourage rapid transit networks (bus, light rail and /or streetcar).	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
2. Designate Frequent Transit Corridors in an updated OCP, where increased densities will be allocated.	NEW OFFICIAL COMMUNITY PLAN policy at the DISTRICT scale provided by the ENGINEERING departments
3. Link densification to public transit access on other corridors (ie – densify near public transit stops).	NEW POLICY at the DISTRICT scale provided by the ENGINEERING department
4. Create a fine grain street network that provides shorter walking distances to transit.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments

## Regional Transit Paths

Public transit plays a crucial role in providing alternative transportation options to residents. During the charrette, major arterials in the study area were logically chosen as major transit corridors. Channelling densities along these corridors and around transit stations will facilitate residents using alternatives to the car. These transit corridors will in turn provide access to local, city wide, and regional destinations.

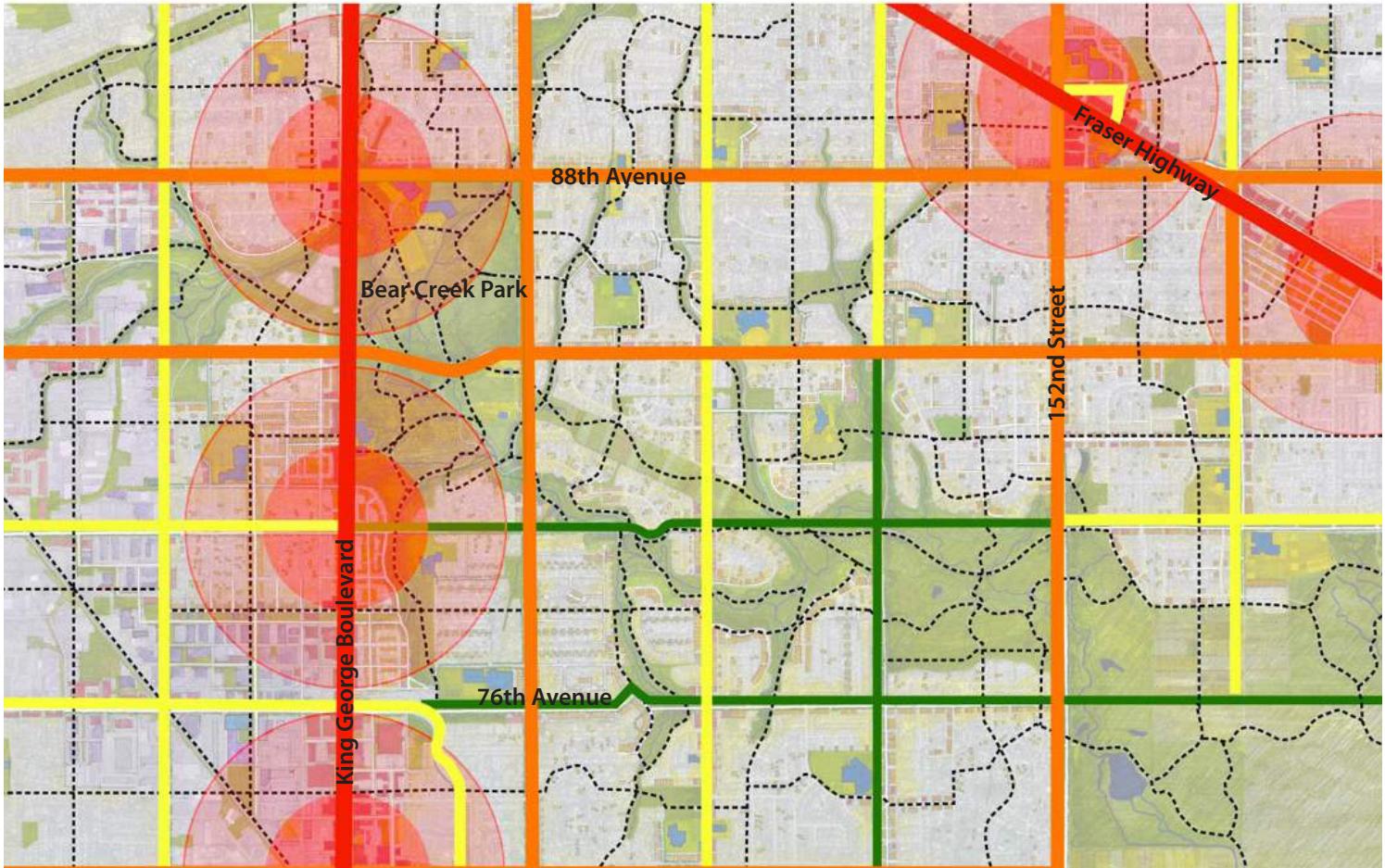


image credit: Mary Wong

**Transit Paths** This map shows additional transit paths within the study site.



## GO Objective Four

Integrate land use and transportation design in order to decrease average trip length and vehicle kilometers traveled.

### Strategies & Actions

Strategy One:

**TRANSIT SUPPORTIVE DENSITY:** Identify specific high density Transit Villages and Corridors. Provide facilities at these locations for increased transit access.

Supporting Actions & Policies:	
1. Allocate higher density within walking distance (800m) of identified Transit Stations to adequately support Frequent Transit and District Energy.	NEW NEIGHBOURHOOD CONCEPT PLAN AND OFFICIAL COMMUNITY PLAN policy at the DISTRICT scale provided by the PLANNING department
2. Support higher densities along future Transit Corridors.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
3. Locate businesses near transit.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
4. Provide bike facilities such as showers and convenient bicycle parking adjacent to major transit stops.	NEW POLICY at the PARCEL scale provided by the ENGINEERING AND PLANNING departments
5. Ensure public washrooms are available near major transit stops, especially for seniors and small children	NEW POLICY at the PARCEL scale provided by the PLANNING department



#### Transit Nodes:

These diagrams show two potential strategies for creating transit nodes at major transit intersections.

1. King George Boulevard at 72nd Avenue
2. Fraser Highway at 152nd Street.

## Communities on the Corridors

Transit Corridors were chosen to accommodate new density in the area. Major intersections of such corridors proved most appropriate for the highest levels of land use mix and density. A careful mixture of uses and services at higher densities will capitalize on transit investments in the corridors, while serving as destinations for the wider area. High density Transit Villages will further increase the viability of local businesses, district energy systems, and public amenity investments.



*image credit: Neda Roonia*

### **Transit Corridors**

This section shows additional density along major transit corridors within the study site. This additional density supports transit and contributes to a vibrant street life along corridors such as King George and Fraser Highway.

## GO Objective Five

Locate commercial, cultural and recreational activities and jobs sites where they can be best accessed on foot and/or via transit.

### Strategies & Actions

Strategy One:

**DISTRIBUTED PARKS:** Utilize School Sites as centres for small-scale Neighbourhood Villages including neighbourhood uses such as coffee shops, day cares, parks, recreational areas, and cultural centers.

Supporting Actions & Policies:	
1. Protect existing school and park spaces as important local amenities.	NEW POLICY at the PARCEL scale provided by the PLANNING department
2. Expand community use of school facilities and park spaces.	UPDATE POLICY at the PARCEL scale provided by the PARKS AND PLANNING departments
3. Allow for uses around school sites that support neighbourhood gathering and learning.	NEW POLICY at the PARCEL scale provided by the PARKS AND PLANNING departments



#### Distributed Gathering Places:

This sketch shows a Neighbourhood Village centred around a school site (blue boxes on plan opposite page). The charrette team saw the opportunity to build upon the even distribution of school sites to create walkable Neighbourhood Villages for the surrounding residents.

image credit: Daniel Roehr

## *Distributed Amenities*

When key amenities are located within walking distance, dependence on the car is reduced. Given that school sites are located evenly and regularly at the center of residential neighborhoods, the charrette team co-located other important public and commercial facilities nearby. In time this will enhance convenience and reduce dependence on the car.



### **Distributed Parks, Commercial, and Cultural Spaces.**

This plan shows parks (green), commercial (red) and cultural (blue) activities distributed throughout neighbourhoods. A key part of this strategy is to create neighbourhood hubs around school sites (blue buildings within green spaces).

## GO Objective Six

Provide a variety of safe and comfortable active transportation alternatives that facilitate recreational as well as purposeful movement.

### Strategies & Actions

Strategy One:

**ACTIVE TRANSPORTATION:** Encourage more sustainable transportation modes by making existing routes safer and more comfortable, and expanding the number of routes.

Supporting Actions & Policies:	
1. Support the City's current Walking Plan.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department
2. Support the City's current Cycling Plan.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department
3. Over time, through re-development, build a lane system to avoid driveways crossing sidewalks.	UPDATE POLICY at the PARCEL scale provided by the PLANNING AND ENGINEERING departments
4. Widen existing pedestrian pathways where feasible	NEW POLICY at the STREET scale provided by the ENGINEERING department
5. Designate bike lanes on Neighbourhood Corridors.	NEW POLICY at the STREET scale provided by the ENGINEERING department
6. Complete the existing bike network.	UPDATE POLICY at the STREET scale provided by the ENGINEERING department

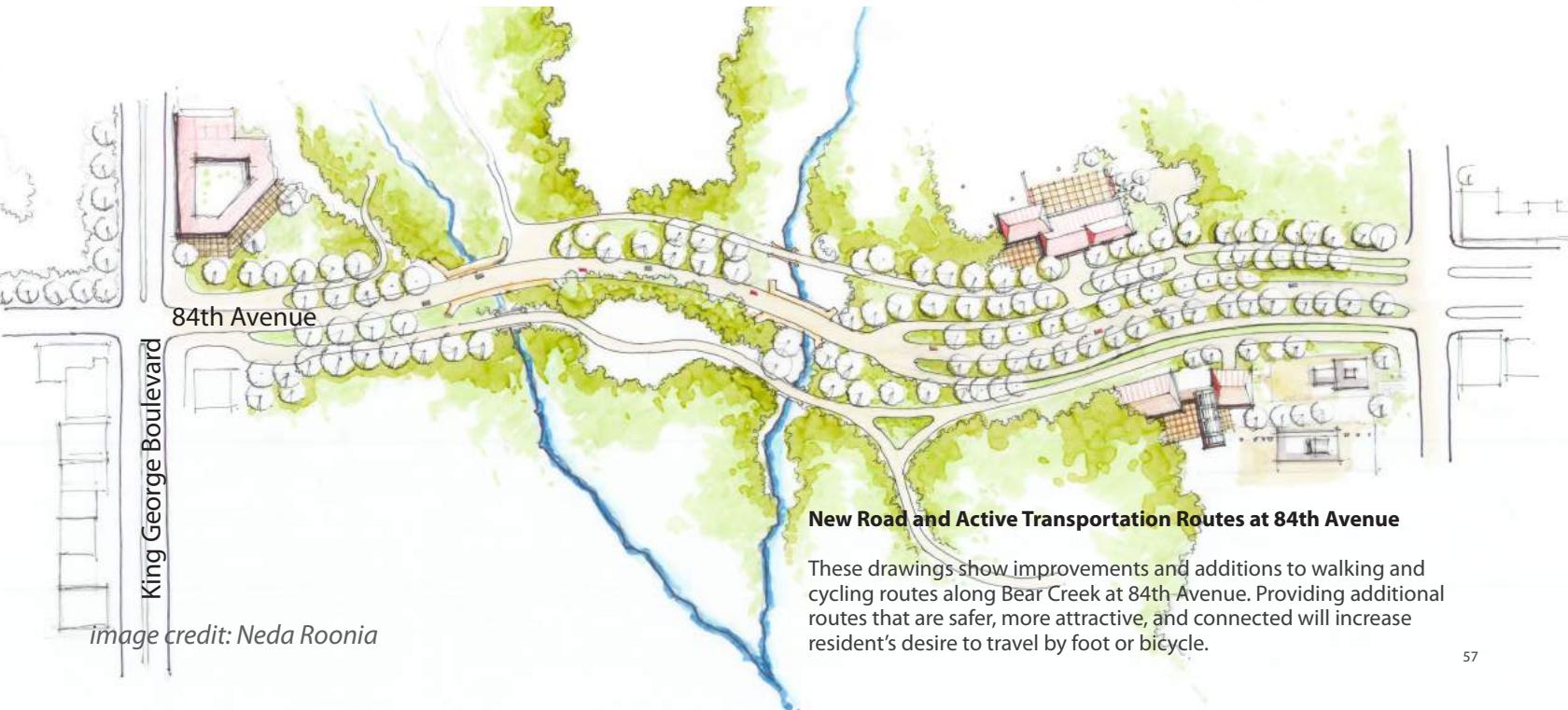
Strategy Two:

**GREEN ACTIVE TRANSPORTATION ROUTES:** Create a network of interconnected green pathways for biking and walking, including riparian corridors and the Hydro rights-of-way.

Supporting Actions & Policies:	
1. Create additional pathways for biking and walking along riparian zones.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
2. Allow for expanded and shared use of the existing green networks.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department
3. Study appropriate places for implementing pedestrian only streets.	NEW STUDY at the DISTRICT scale provided by the PLANNING department

## Complete a Green Grid

The quality of the public realm is critical to the overall walkability of an area. The charrette team located alternative pathways for cycling and walking along Bear Creek and adjacent riparian corridors. They also decided to emphasize strategies for making existing streets safer and more amenable to non-motorists of all ages.



### New Road and Active Transportation Routes at 84th Avenue

These drawings show improvements and additions to walking and cycling routes along Bear Creek at 84th Avenue. Providing additional routes that are safer, more attractive, and connected will increase resident's desire to travel by foot or bicycle.

Image credit: Neda Roonia

## GO Objective Seven

Create complete streets for all populations, while enhancing street quality in order to make them attractive and safe for different transportation modes.

### Strategies & Actions

Strategy One:

**COMPLETE STREETS:** The road section should support the functioning of adjacent land uses and should facilitate alternative movement options such as walking and cycling.

Supporting Actions & Policies:	
1. Revise existing street plans to allow for greater shared space and active uses within these areas, creating 'complete streets'.	UPDATE POLICY at the STREET scale provided by the ENGINEERING department
2. Revisit local street standards (width and uses, see Appendix 01 for more details).	UPDATE POLICY at the STREET scale provided by the ENGINEERING department
3. Develop a 'road diet' strategy for appropriate streets– reduce 4 lanes to 2 with bike lane.	NEW STUDY at the STREET scale provided by the ENGINEERING department
4. Always apply new road standards with re-development, even if there is an existing curb or sidewalk.	NEW POLICY at the STREET scale provided by the ENGINEERING department

Strategy Two:

**REDUCE PARKING:** Reduce parking requirements, particularly near Frequent Transit Networks.

Supporting Actions & Policies:	
1. Secure 'off-site' parking space in densifying neighbourhoods as an interim strategy until transit is provided.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
2. Revisit RF-9 and RF-12 in terms of parking, addressing: parking issues in laneways, use of parking for storage, lack of permeable area, no visitor parking.	UPDATE ZONING at the PARCEL scale provided by the PLANNING department
3. Develop a plan for preferred parking areas for zip-cars, car-pooling, etc.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
4. Expand paid parking in Transit and Urban Village areas.	NEW POLICY at the DISTRICT scale provided by the PLANNING department
5. Employ similar strategy as Surrey City Center in Transit Villages, where parking requirements are reduced by 25%.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
6. As large strip commercial re-develops, replace surface parking with structured or underground, paid parking.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments

## Streets for Everyone

Streets are the most important element of the public realm. Streets and corridors are not only for cars and movement, but also serve as places for people. To be successful public spaces, they require careful integration with surrounding land uses. This need is further amplified as major re-development occurs along major corridors and arterials. The Charrette envisioned more 'complete streets,' which dedicate more space to walking biking and transit than is presently the case.

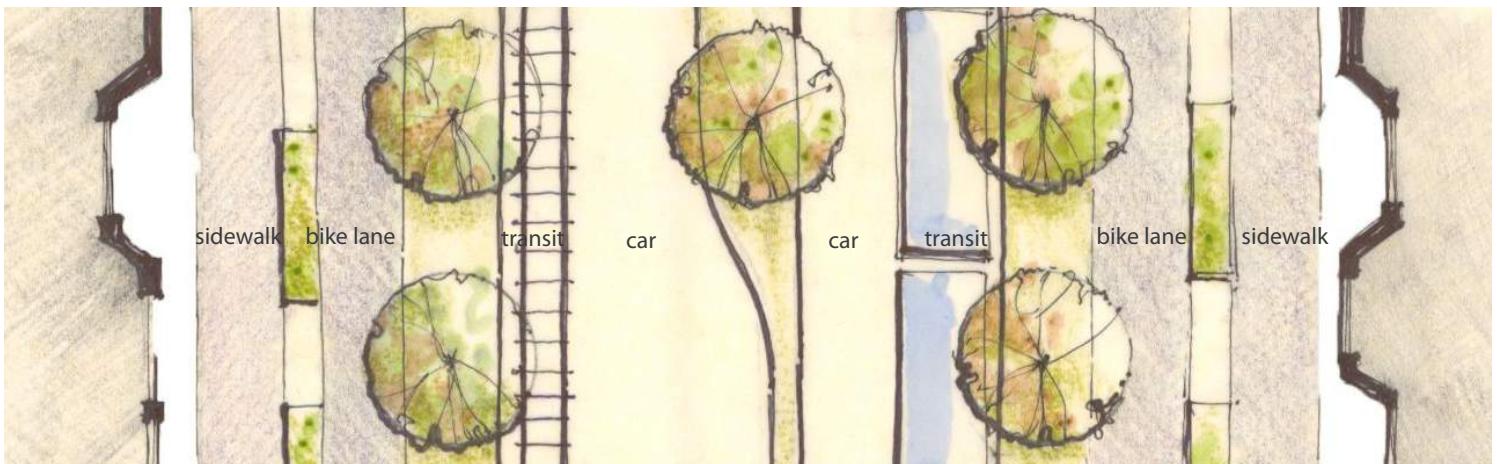
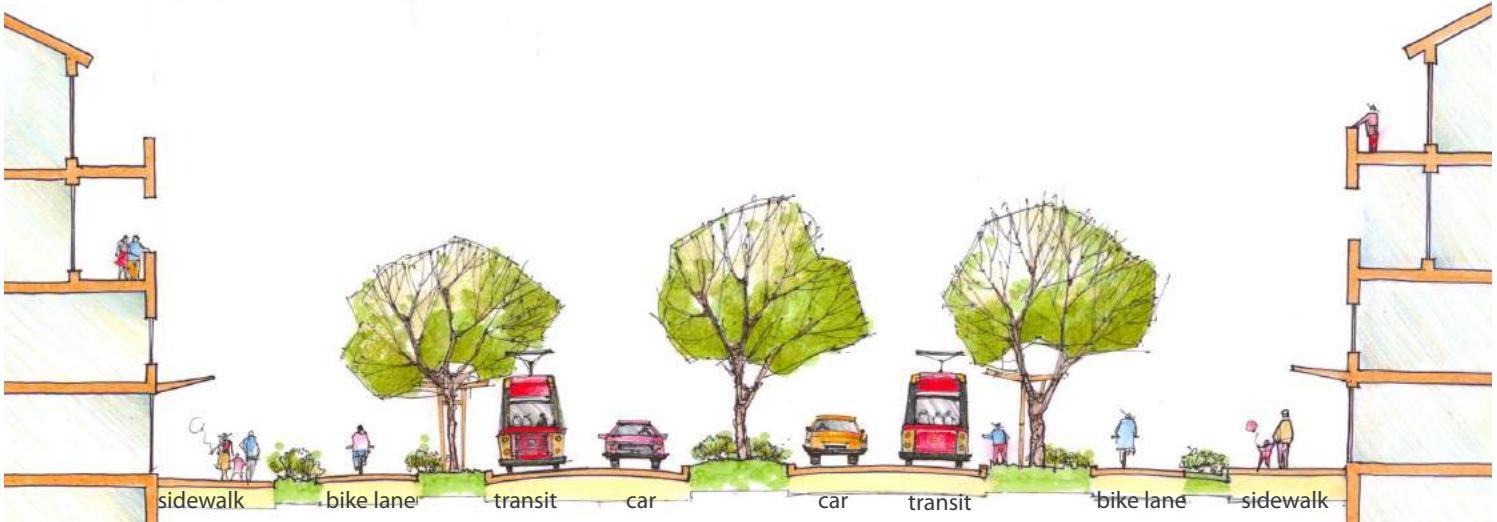


image credit: Neda Roonia

### Complete Streets

New streets dedicate more space to active transportation, green infrastructure, and active street life.

## GO Objective Eight

Provide supportive infrastructure and end-of-trip facilities for alternative modes of transportation, such as showers, bike facilities, and restrooms in private and public buildings and spaces, and provide options for car sharing and car pods.

### Strategies & Actions

Strategy One:

**SUPPORT CYCLING:** Facilitate biking, especially in major villages and corridors.

Supporting Actions & Policies:	
1. Implement the Cycling Plan, and associated zoning changes.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
2. Facilitate a bike share program in Transit and Urban Villages.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
3. Create bike share lots on the periphery of Transit Villages - Park and Bike.	NEW POLICY at the PARCEL scale provided by the PLANNING AND ENGINEERING departments
4. Require dedicated bike facilities in villages, such as shelters at major transit stops.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments

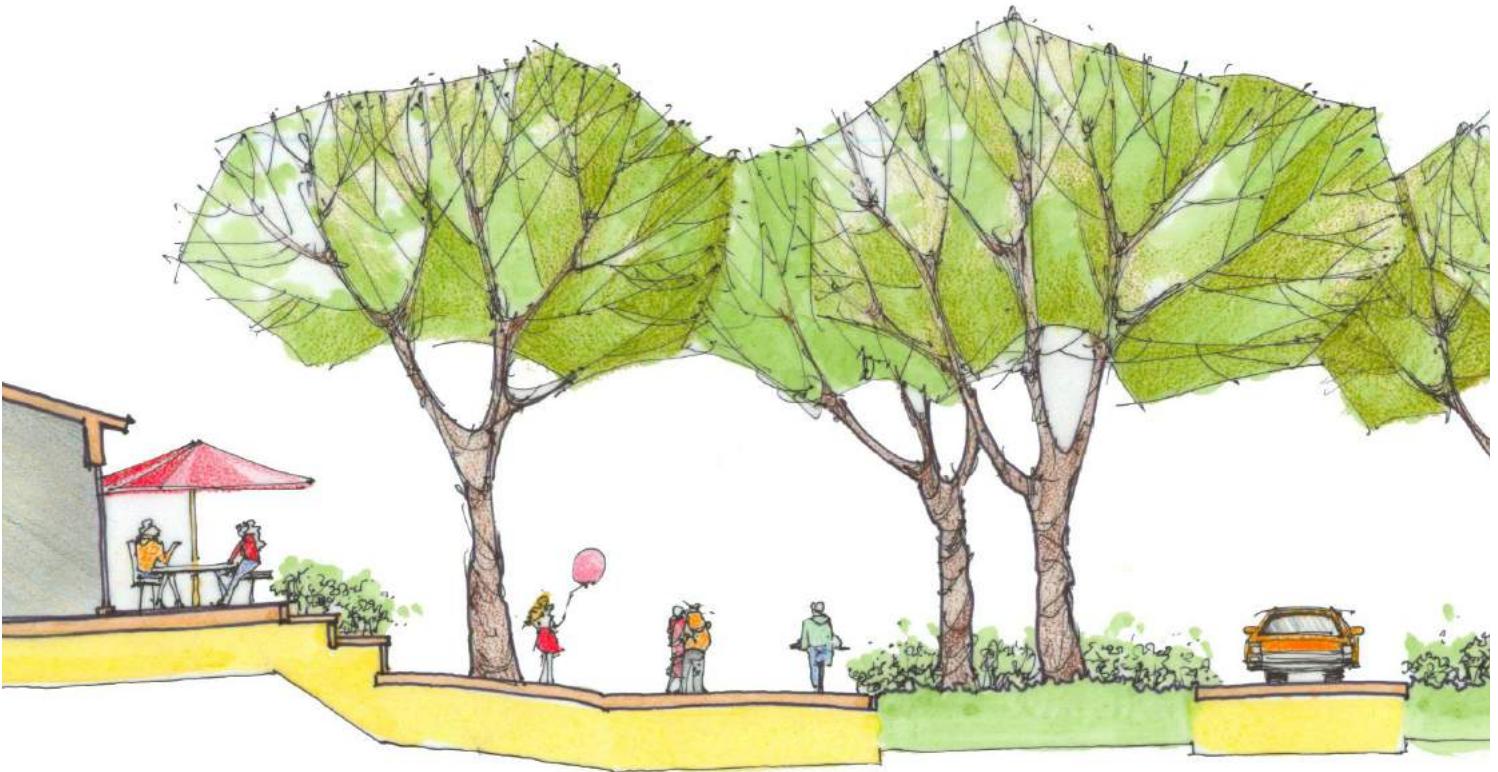
Strategy Two:

**ELECTRIC CAPABILITY:** Tie electric modes into nodes and transit corridors.

Supporting Actions & Policies:	
1. Build upon Surrey's recent success in securing funding to build electric vehicle charging stations in 14 civic facilities by extending this program to additional facilities and building types.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
2. Create policy around providing electric vehicle charging in public and private sector commercial buildings.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
3. Develop policy on defining where to promote additional electric charging stations, such as recent bylaw amendments requiring Type III charging stations at all new gas stations.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments

## Compelling Destinations

Around Villages and Transit Corridors, a two pronged approach of reducing required parking coupled with better cycling and transit facilities will incent alternative and more sustainable transportation choices. These areas could also provide new electrical chargers and other facilities for smaller electrical mobility devices, particularly as the mobility needs of an aging population change.



*image credit: Neda Roonia*

### **Infrastructure for Alternative Transportation**

Less space for parking and more space for small electric vehicles, bicycles, and people will encourage residents to choose transportation options other than the private automobile.

## WORK: Employment Strategies for Sensitive Urban Infill

Surrey was once a bedroom community. No more. The City now has almost as many jobs as workers, and will likely hit a balance soon, assuming the City can be accommodating. Fortunately, the study area already has large employment sites, notably the rail served industrial area at King George Boulevard and 76th avenue. A second significant employment area exists along Fraser Highway between 159th and 188th streets. It should also be noted that this area, and other city areas like it, provides a lot of jobs that are not immediately obvious, particularly those associated with local schools and local commercial service providers. The challenge, however, was to come up with an additional 23,000 jobs within this already built up area.

The problem seemed daunting at first; but on closer examination the team found that the study area includes many zones where job density can be increased. Two main strategies for increasing jobs were chosen. The first was to maximize the number of commercial and office jobs located along the Fraser Highway and King George Boulevard transit corridors. For the sake of this project we assumed that all new mixed use construction along these corridors would provide at least one floor of either commercial or office jobs. This general support for mixed-use does not signify a prohibition on single use office projects for clients who demand them, only that in general the corridors are mixed-use and that a reasonable percentage of the floor space, roughly 25% in our estimates, will be space producing jobs. The second was to provide policies designed to increase the intensity of jobs in existing jobs areas. Existing jobs sites often produce fewer jobs than is optimal, dedicated as they often are to low intensity warehousing and shipping functions. A city strategy to gradually improve the physical settings for industry by enhancing road, park, and natural open space amenities will help attract entrepreneurs looking for first class space. The introduction of light rail along King George will dramatically change the regional profile for this area. The city should be ready to capitalize on this change. Also, the city can encourage additional jobs by instituting policies to accommodate two story or even hybrid office/industrial structures, in special “high intensity” industrial zones.

The industrial zone at King George and 76th Avenue also provides an important opportunity for an “eco industrial park”. Central to this vision would be a district heating system linking new and existing high density job sites to nearby residential sites of high density and mixed-use housing as well as commercial/office mixed use sites along King George Boulevard. With this strategy Surrey could be the first city in the region to create a true eco industrial park. Live/work housing at the edges of this district would be a natural ancillary to such a strategy.

These were not the only ways to create jobs of course. New and expanded community services was another: the increase in population will necessitate an increase in the numbers of school teachers and health care service providers in the area. Last but not least, the area connects to Surrey’s ALR lands. Jobs in agriculture and community focused agriculture can and should be a significant part of a sustainable development strategy for this and other similar Surrey districts.



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## WORK Objective One

Support and promote local employment by incorporating strategies for a balance of one local job for every dwelling unit.

### Strategies & Actions

Strategy One:

**EXPAND EMPLOYMENT:** Expand the definition of employment and employment lands to allow for a diversity of job-creating spaces.

Supporting Actions & Policies:	
1. Change zoning to allow for employment within neighbourhoods to support uses such as day cares, education centres, health services, and learning services.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department
2. Within existing park spaces and school sites, create destinations and enhance recreational employment opportunities (eg. Bike rental, restaurant, weddings, eco-tourism, etc).	UPDATE ZONING at the PARCEL scale provided by the PLANNING AND PARKS departments
3. Loosen the current guidelines for commercial space in the catchment of Neighbourhood Villages to allow for uses such as coffee shops and grocery stores.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department

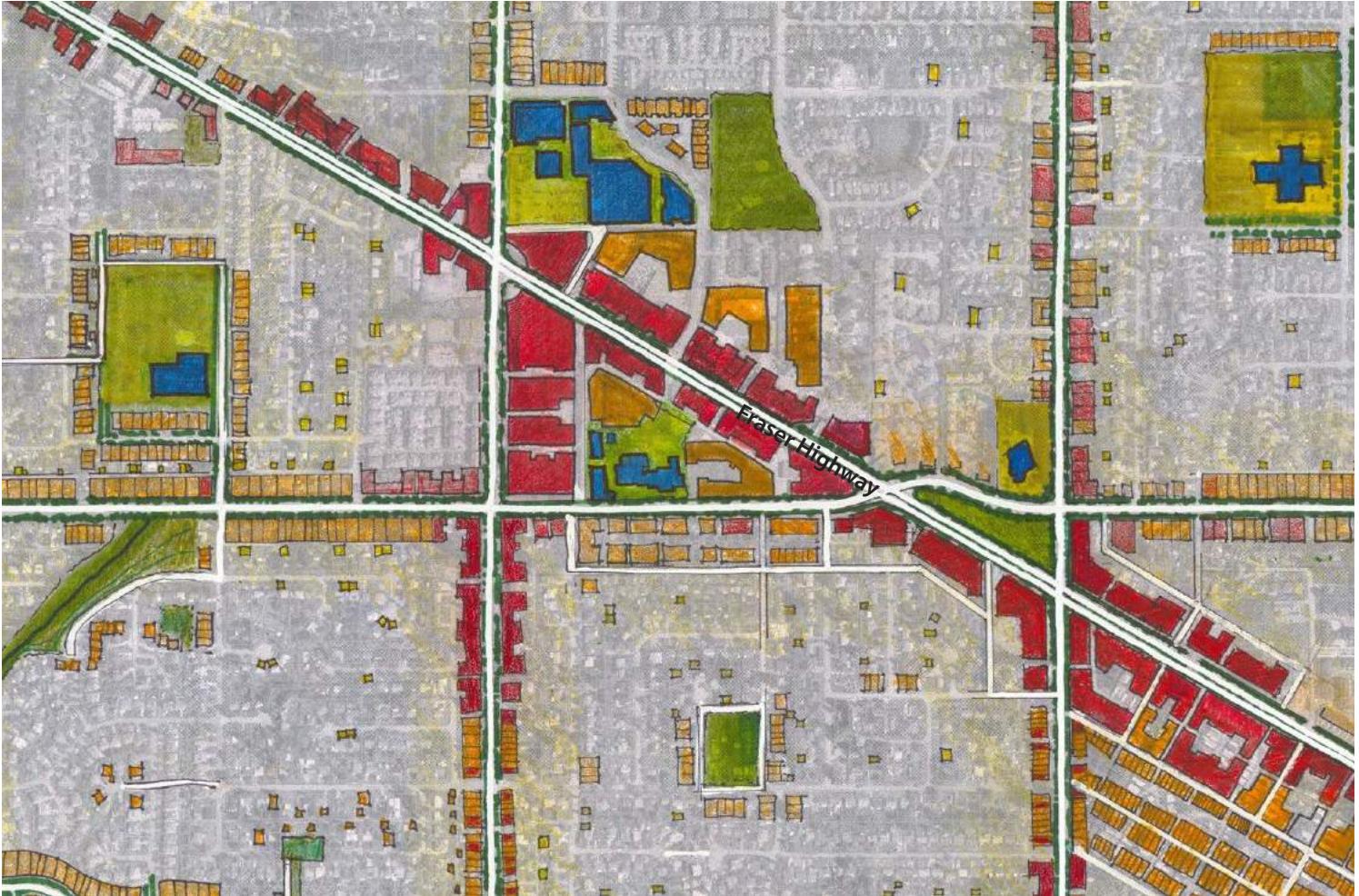
Strategy Two:

**FLEXIBLE EMPLOYMENT:** Be more fluid and flexible to enable employment opportunities, which arise from changing economic environment.

Supporting Actions & Policies:	
1. Require flexible building design that allows for easy retrofitting, particularly in industrial areas.	NEW DESIGN GUIDELINES at the PARCEL scale provided by the PLANNING department
2. Permit a more flexible density in employment areas, especially if uses include community services and non-profit work.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department
3. Define "Flex" spaces, in order to accommodate different uses within a flexible building envelope. Uses can include: commercial, service, office, light industry, other home business, and/or residential.	NEW ZONING at the PARCEL scale provided by the PLANNING department
4. Study the appropriate level of "Industrial Activity" for flex spaces, such as light-impact, small-scale manufacturing.	NEW STUDY at the PARCEL scale provided by the PLANNING department
5. Where flex development along arterials is identified, adding on-street parking will be examined on a site-specific basis only.	NEW POLICY at the PARCEL scale provided by the PLANNING AND ENGINEERING departments

## Jobs Close to Home

The nature of urban economies in the developed world is changing, requiring a rethinking of industrial, commercial and service oriented job spaces and related activities. The City of Surrey, with its diverse population, is already experiencing some of these shifts. The challenge will be to effectively utilize land, while accommodating various types of employment in appropriate job spaces.



### **New employment opportunities**

Urban villages and Transit Corridors, such as Fraser highway (above) can accommodate a large number of commercial and office related service jobs below new residential units in high density mixed-use buildings. Major institutions such as hospitals, schools and community centers can accommodate further jobs as population increases in the area. New communication technologies make home-based work more viable, especially in areas close to services and transit.

## WORK Objective Two

Provide support for a full range of local employment opportunities, especially green businesses, and encourage green business practices. Encourage diverse employment opportunities in areas with high concentration of immigrants, visible minorities and vulnerable populations.

### Strategies & Actions

Strategy One:

**INDUSTRIAL EFFICIENCY:** Preserve and support existing industrial areas, while allowing for greater intensity and flexibility of uses within these areas.

Supporting Actions & Policies:	
1. Support and encourage value-added intensification, and densification of the existing industrial area near the interurban railroad.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department
2. Enhance and protect existing industrial areas without housing, and promote 24-hour use (eg. three 8-hour shifts).	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department
3. Restrict residential-only development in industrial areas to keep land values affordable for industry.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department
4. Redefine the industrial designation of the East Newton Industrial area to allow for more diverse business uses while restricting purely commercial uses.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING department

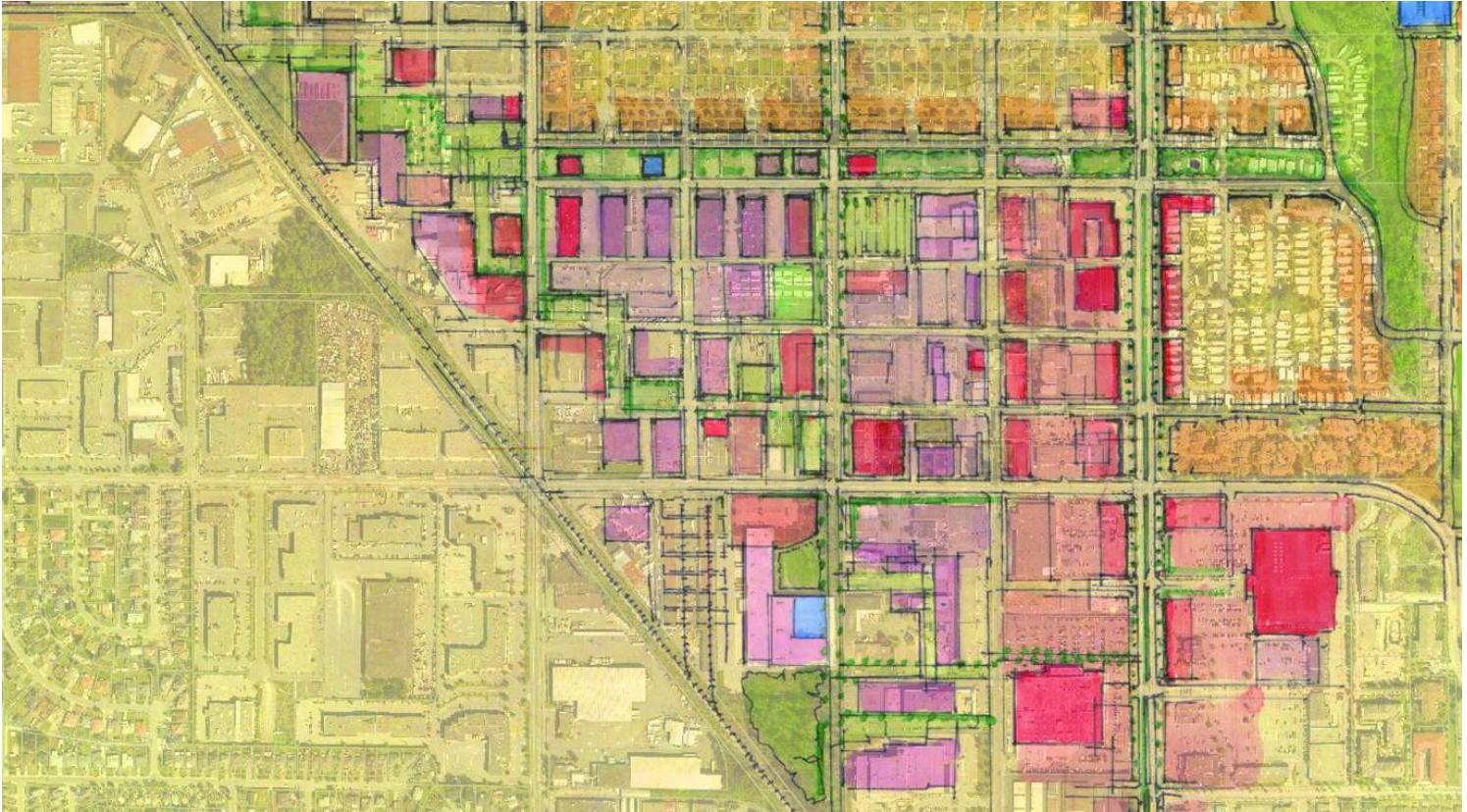
Strategy Two:

**CULTURAL EMPLOYMENT:** Be more fluid and flexible to enable employment opportunities, which arise from changing economic environment.

Supporting Actions & Policies:	
1. Create a new Comprehensive Development Zone for the activities around the Punjabi market/Little India village.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
2. Encourage use of the of the revived interurban rail line and/or the proposed King George Highway light rail line to bring passengers into the Little India village.	NEW POLICY at the DISTRICT scale provided by the PLANNING department

## Employment Diversity

The City of Surrey's increasingly diverse population requires a diverse economy. This necessitates a changing in the understanding of work, employment space, and activities that sustain local cultural groups. The employment lands within the study area need to accommodate this changing economic landscape more efficiently.



### LEGEND

-  Multi-storey Industrial Buildings
-  1-2 storey Industrial Buildings
-  Mid Rise Mixed Use Buildings
-  1-4 storey Mixed Use Buildings
-  Civic Buildings
-  Green Space

*image credit: Rob Lane*

### Industrial character

The strategic location of the industrial lands close to King George Boulevard allows for a rethinking of the nature of these lands. Gradual densification along the transit corridor combined with intensification of economic activity within these lands can be conducive to the formation of an Eco-industrial park. The industrial park can provide a centralized heat exchange system between heat producing industrial lands and heat using residential areas. A broader definition of "industrial" can stimulate cultural - commercial activity such as the Punjabi market, office space above industrial space, and even some residential use, while maintaining the overall industrial character and integrity of the area.

## WORK Objective Three

Protect, intensify, and maintain employment land efficiently. Promote the co-location or clustering of a range of appropriate businesses and personal services that support compact and complete employment areas while reducing the need for unnecessary car or truck trips to access these services.

### Strategies & Actions:

Strategy One:

**EFFICIENT EMPLOYMENT:** Be more efficient with existing land.

Supporting Actions & Policies:	
1. Allow flexible live/work spaces along arterials with lanes at rear (uses can include commercial, office, services, light-industrial).	NEW ZONING at the DISTRICT scale provided by the PLANNING department
2. Encourage the vertical expansion of industrial lands, by introducing new buildings appropriate for new industrial uses.	NEW DESIGN GUIDELINES at the PARCEL scale provided by the PLANNING department

Strategy Two:

**CLUSTERED EMPLOYMENT:** Promote clustering of employment and mixed-use areas with shared infrastructure.

Supporting Actions & Policies:	
1. Develop policy on 'Employment Density Areas' for each of the Village types (Transit, Urban, Neighbourhood) to identify the appropriate level of employment and commercial activity for each type.	NEW POLICY at the PARCEL scale provided by the PLANNING department
2. Support the co-location of mutually-supportive businesses.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
3. Support and provide economic development tools and networks that encourage communication and synergy between businesses.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ECONOMIC DEVELOPMENT departments



## WORK Objective Four

Protect the integrity of the agricultural land reserve (ALR) in Surrey, as well as industrial areas that support food production, employment, agro-business services and agro-tourism that contribute to the local economy.

### Strategies & Actions

Strategy One:

**DIVERSE AGRICULTURE:** Encourage and support incubator farms on unused portions of the ALR and expand the local agro-business.

Supporting Actions & Policies:	
1. Allow incubator farm opportunities in parks within the Agricultural Land Reserve.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND PARKS departments
2. Develop edge conditions along the Agricultural Land Reserve which support farming (eg. Farm markets).	NEW ZONING at the DISTRICT scale provided by the PLANNING department
3. Support farm tours for agro-tourism.	NEW POLICY at the DISTRICT scale provided by the ECONOMIC DEVELOPMENT department
4. Change zoning to permit farmers markets at strategic locations.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING department

Strategy Two:

**SMALL SCALE AGRICULTURE:** Encourage and support small scale agro-businesses.

Supporting Actions & Policies:	
1. Engage with educational institutions to mentor start-up farms.	NEW POLICY at the DISTRICT scale provided by the ECONOMIC DEVELOPMENT department
2. Relax zoning to allow for utilization of backyards in single-family areas for small agro-businesses and farming.	UPDATE ZONING at the PARCEL scale provided by the PLANNING AND ENGINEERING departments
3. Support market gardens (allotments) along the Hydro ROW, and other under-utilized land, including city-owned.	UPDATE ZONING at the DISTRICT scale provided by the PLANNING AND PARKS departments
4. Ensure all scales of farms have easy access to processing and sales opportunities, such as canning facilities and farmers markets.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ECONOMIC DEVELOPMENT departments
5. City of Surrey partners with larger farms to arrange for equipment borrowing.	NEW POLICY at the DISTRICT scale provided by the ECONOMIC DEVELOPMENT department

## Local Food

Local food production contributes to a smaller ecological footprint for the community, and enhances the resiliency of the local economy and food systems. Many community based jobs can grow out of the production, processing, and sale of these products. Promote “working green” areas, including consolidated backyard growing opportunities, start-up incubator farms, and for-profit community allotments along the Hydro ROW.



### Diverse Food Production

A diverse system of local food production supports growers at all scales and provides space for processing and sales of local food products.

## WORK Objective Five

Encourage the use of green building practices in new construction as well as the retrofit of existing buildings.

### Strategies & Actions

Strategy One:

**ECO-INDUSTRIAL:** Support the creation and evolution of an eco-industrial area using green development practices.

Supporting Actions & Policies:	
1. Identify specific advantages of creating an eco-industrial park.	NEW STUDY at the DISTRICT scale provided by the PLANNING AND SUSTAINABILITY departments
2. Support and encourage value-added intensification and densification of the existing industrial area.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
3. Identify a communal recycling and composting area to be used by the industrial park and work with local companies to set it up.	NEW STUDY at the PARCEL scale provided by the PLANNING department

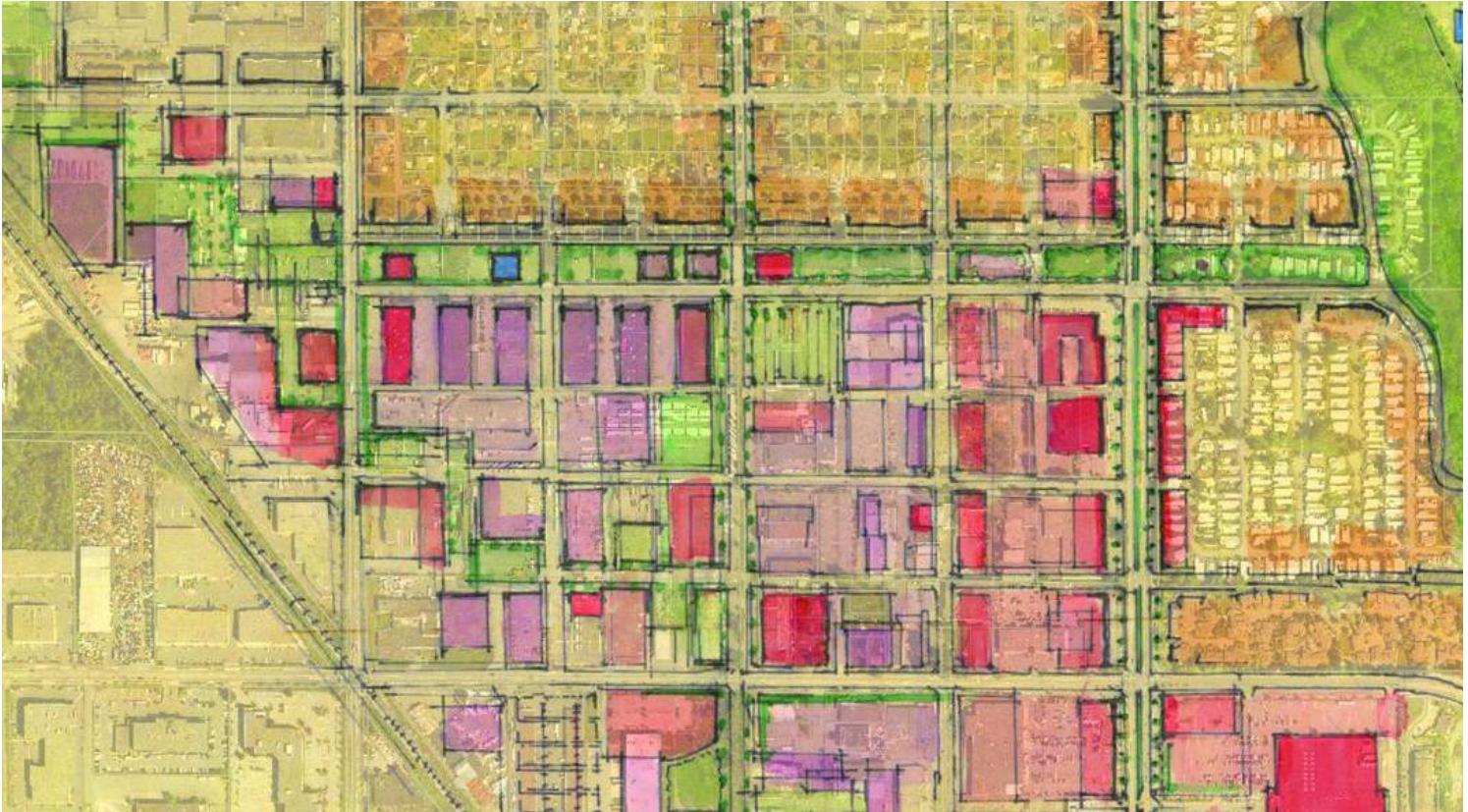
Strategy Two:

**ENERGY EFFICIENT BUILDINGS:** Ensure all new buildings are energy efficient.

Supporting Actions & Policies:	
1. Require new developments in District Energy supply areas to be compatible with District Energy as condition of rezoning.	NEW POLICY at the DISTRICT scale provided by the SUSTAINABILITY department
2. Orient higher density lots for solar access.	NEW POLICY at the PARCEL scale provided by the PLANNING department
3. Review existing land development requirements to ensure infrastructure requires less energy and resources to build and maintain.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
4. Develop energy efficient Design Guidelines (for example, encourage passive solar design for low density developments).	NEW DESIGN GUIDELINE at the PARCEL scale provided by the PLANNING department
5. Provide density bonusing policy to incentivise higher energy performance standards than required by BC Building code.	NEW POLICY at the PARCEL scale provided by the PLANNING department
6. Develop a city-wide policy to adopt a solar hot water ready bylaw as a building code add on.	NEW BYLAW at the PARCEL scale provided by the PLANNING, ENGINEERING, SUSTAINABILITY departments
7. Require a solar orientation study of building and tree placement for development permit.	NEW BYLAW at the PARCEL scale provided by the PLANNING department
8. Create incentives for household efficiency and create education campaigns for improved efficiencies of appliances, lights, etc.	NEW INCENTIVE at the PARCEL scale provided by the SUSTAINABILITY department

## Green Buildings

Through adoption of green building practices, Surrey can contribute to the creation of a local 'green jobs' industry while also increasing the sustainability of the area. Industrial lands create particular opportunities for intentional co-location and clustering of 'green' industries.



### LEGEND

-  Multi-storey Industrial Buildings
-  1-2 storey Industrial Buildings
-  Mid Rise Mixed Use Buildings
-  1-4 storey Mixed Use Buildings
-  Civic Buildings
-  Green Space

*image credit: Rob Lane*

### Eco-Industrial Area

Over time the industrial area transforms into an Eco-Industrial area where waste and pollution are reduced. A new District Energy system supplies renewable energy to surrounding buildings. New and retrofitted Green Buildings are more energy efficient, and new green spaces provide amenity and natural stormwater treatment. Waste is further reduced through communal recycling and composting facilities.

## WORK Objective Six

Provide learning and training opportunities and facilities for youth, while encouraging lifelong learning and development for all citizens and all ages.

### Strategies & Actions

Strategy One:

**EXTENDED LEARNING:** Promote extended learning by integrating schools, institutions, parks, religious buildings, cultural centers, and learning for all ages in the Community Learning Centres.

Supporting Actions & Policies:	
1. Support the development of Neighbourhood Villages as “Community Learning Centers,” which offer a variety of community services including work opportunities for not-for-profit businesses, social enterprises, and learning opportunities for skills-development.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
2. Undertake a review of school sites and surrounding blocks to determine where infill and re-zoning should take place.	NEW STUDY at the DISTRICT scale provided by the PLANNING department
3. Support and encourage social programming for youth and services in the study area.	NEW PROGRAM at the DISTRICT scale provided by the PLANNING department
4. Encourage learning opportunities and skills training with incubator farms and the eco-industrial network.	NEW PROGRAM at the DISTRICT scale provided by the ECONOMIC DEVELOPMENT department

## Community Learning

A rapidly changing world economy means that learning never stops. Cities can play an important role by fostering learning in their communities, through more effective use of their existing facilities and resources and a deliberate policy around learning opportunities for all.



*image credit: Daniel Roehr*

### **Community Learning Centres**

Neighbourhood Villages serve as “Community Learning Centres” where residents of all ages can participate in educational and recreational activities. These could include: food production, fitness and dance classes, arts and culture, local markets, local groceries, seniors and child care, and/or bicycle repair shops.

## WORK Objective Seven

Facilitate the development of social enterprises and non-profit organizations.

### Strategies & Actions

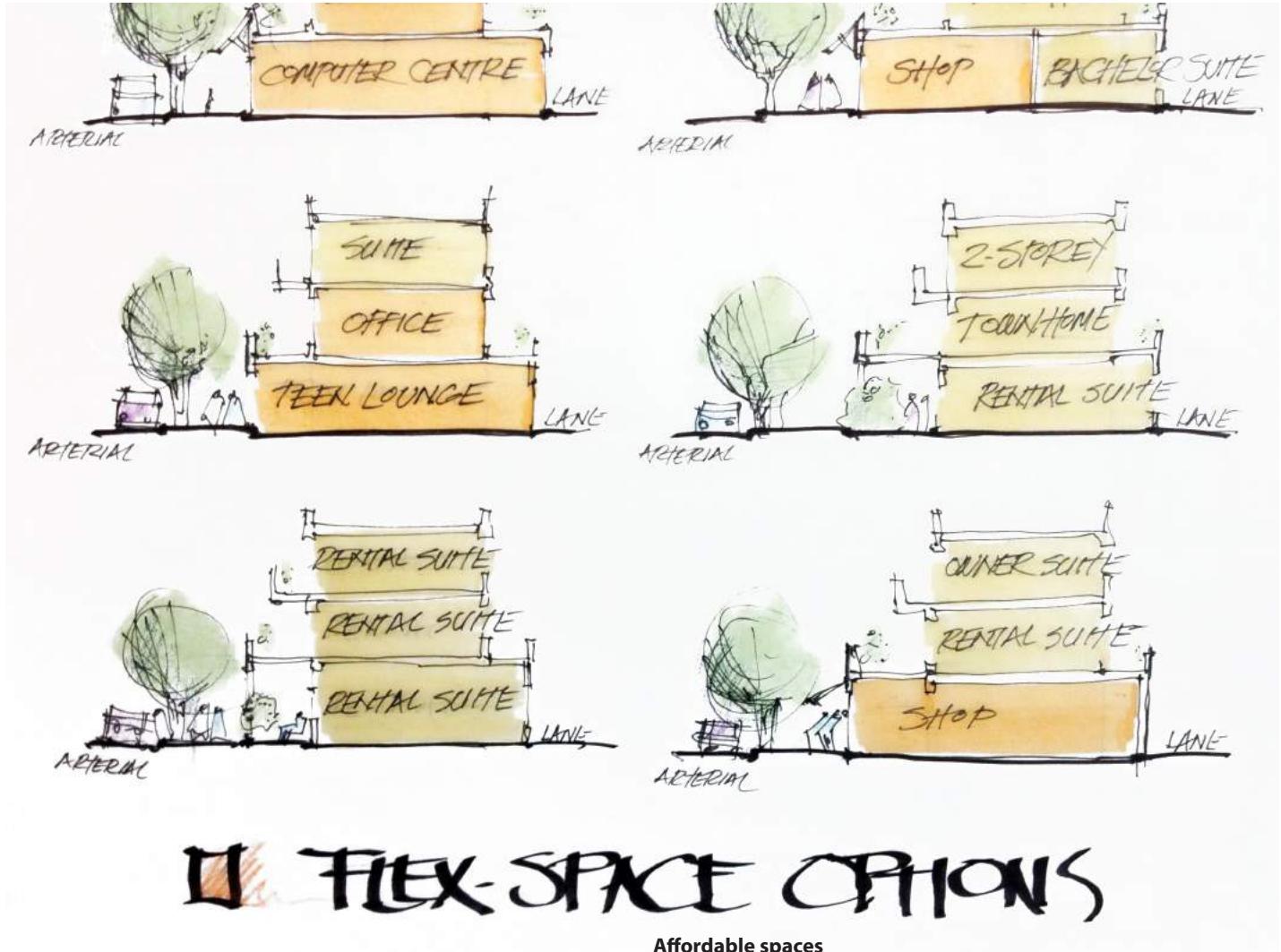
Strategy One:

**AFFORDABLE EMPLOYMENT:** Provide affordable start-up business spaces.

Supporting Actions & Policies:	
1. Expand the current 'community service use' policy adjacent to Neighbourhood and Urban Villages to allow for multiple uses of these spaces. Additional uses could include: garden plots, non-profit space and small enterprise incubator spaces.	UPDATE POLICY at the PARCEL scale provided by the PLANNING department
2. Provide opportunity for start-up for profit and non-profit models (mixed employment uses) or hubs near transit stations.	NEW POLICY at the PARCEL scale provided by the PLANNING department
3. Provide inexpensive, shared communal office spaces which are accessible and decentralized.	NEW POLICY at the PARCEL scale provided by the PLANNING department
4. In City owned spaces, allow social service partners and non-profits to rent space cheaply.	NEW POLICY at the PARCEL scale provided by the PLANNING AND PARKS departments
5. Authorize Surrey City Development Corporation to purchase units for the use of specific social services groups.	NEW POLICY at the PARCEL scale provided by the PLANNING department

## Affordable Work Spaces

The charrette team explored innovative options for job creation and business incubation. They proposed policies and building regulations that would incent smaller scale start up businesses, increase the resiliency of the local economy, and allow for easy expansion, all without the need for expensive space.



## W FLEX-SPACE OPTIONS

### Affordable spaces

In order to provide affordable and flexible work space for the local community, new developments along secondary transit corridors can be created by consolidating a small number of lots (2 to 6 lots) appropriate for small scale affordable wood frame development.

image credit: Ron Walkey

## WORK Objective Eight

Provide live/work opportunities within this area.

### Strategies & Actions

Strategy One:

**WORK AT HOME:** Support the expansion of existing single family dwellings to accommodate additional home-based business opportunities.

Supporting Actions & Policies:	
1. Allow for the expansion and retrofit of single family houses (eg. reducing front yard setbacks and increasing lot-coverage) to accommodate home-based businesses.	UPDATE ZONING at the PARCEL scale provided by the PLANNING department
2. Adjust home-based business regulations to allow for greater opportunities within residential zones.	UPDATE ZONING at the PARCEL scale provided by the PLANNING department
3. Work with the Provincial Government to discuss changes to the BC Building Code to accommodate increases in home based businesses and to reduce code standards for these smaller businesses (i.e. not a commercial building code standard).	UPDATE CODE at the PARCEL scale provided by the PLANNING department
4. Limit the number of home-based businesses allowed in cul-de-sacs to reduce parking conflicts until another appropriate solution is found.	UPDATE ZONING AND POLICY at the PARCEL scale provided by the PLANNING AND ENGINEERING departments
5. Support home-based businesses with distributed commercial spaces in Neighbourhood and Urban Villages that provide services such as copy shops or coffee shops for meetings.	NEW ZONING at the PARCEL scale provided by the PLANNING department

## Work at Home

An increasing number of people are engaged in new work arrangements such as telecommuting, self-employment, and home-based businesses. During the charrette, the challenges and opportunities of such new work practices were discussed. For example, these new work types reduce commute time, while posing parking challenges on the local streets. Careful regulation of these home-based practices can mediate potential problems while fostering a local economy.



## FLEX-SPACE

## WHAT IS IT?

- 1 FLEX-SPACE IS IN NEWLY CONSTRUCTED GROUND FLOOR SPACE ALONG COMMUNITY ARTERIES.
- 2 IT PROVIDES NEW RESIDENTIAL OPTIONS OR ACTIVITY AND WORK OPPORTUNITIES LINKING THE NEIGHBOURHOOD TO COMMUNITY
- 3 WORKPLACE CLOSE TO HOME!

image credit: Ron Walkey

### Home based businesses

A changing economy means changing jobs. Surrey is seeing more self employment and home based businesses as a result. Changes in land use policies can enhance entrepreneurial opportunity and accomodate these trends.

## GREEN: Green Systems for Sensitive Urban Infill

The Green team had two basic tasks. To protect, expand and capitalize on the extensive green areas of the site, and to consider ways to reduce the energy and material demands of residents and community activities.

The most important objective under the first part of this challenge was to protect and expand site biodiversity. The Bear Creek watershed network is rich salmon habitat and home to many terrestrial animals. These continuous corridors of water and vegetation constitute one of the region's largest intact urban drainage systems. This is a tremendous asset, but one that has not been effectively protected and expanded, nor has its recreational or place-making possibilities been capitalized upon. To protect and extend this system's reach, the plan shows subtle but significant changes. In many locations where the system is hidden, the plan suggests a strategy of gradual land acquisition that will bring the system, which is now largely hidden behind backyard fences, to the "front door" of the city. Acquisitions shown are also in areas where the vegetative stream buffer is too narrow to provide habitat for fish or to protect the stream from overheating.

Absolutely integral to this ambition is protecting the watershed. Currently, most of the storm drains in this area discharge unmitigated into the nearest stream. This overheats, erodes, and pollutes the stream, compromising its beauty and its ability to sustain aquatic life. The solution is to infiltrate storm water, a strategy already in use in newer parts of the city. Storm systems must be gradually retrofit to mitigate these consequences, with storm water infiltration into soil the ubiquitous strategy employed. This is an ambitious task but can be phased in over 50 years in conjunction with the periodic reconstruction of existing streets.

Green areas still available within the district also create opportunities for local food production and food security. Many hectares of land are available in utility corridors and at the edge of the ALR for this purpose. Restoring and enhancing easy access through the completion of a dramatic and linked system of natural areas and parks would be a crucial precondition for accomplishing this end.

Finally, the study area provides interesting and practical opportunities to save resources and generate energy. The initial foray of the City into district heating systems at Surrey City Center can, in time, be extended to the study site. Two main hubs, one on Fraser Highway, the other on King George Boulevard, are locations for district heating plants which may soon become economically viable. School sites and surrounding densified residential areas suggest a second step for the not too distant future. Ultimately, these systems could be linked in a district wide network that would reach most homes and job sites in the study area.



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## GREEN Objective One

Protect, conserve and enhance parkland, the natural environment and biodiversity such as fish bearing streams, wildlife corridors, habitat hubs and natural riparian systems.

### Strategies & Actions

Strategy One:

**INCREASE RIPARIAN CORRIDORS:** Increase the width of riparian corridors where they are too narrow to support ecological functioning.

Supporting Actions & Policies:	
1. Acquire parcels in strategic locations where riparian corridors are too narrow to sufficiently protect ecological functioning.	NEW POLICY at the PARCEL scale provided by the PLANNING AND PARKS departments
2. Develop policies to augment riparian setbacks adjacent to stream corridors.	NEW POLICY at the PARCEL scale provided by the PLANNING AND PARKS departments

Strategy Two:

**NEIGHBOURHOOD POCKET PARKS:** Implement neighbourhood pocket parks

Supporting Actions & Policies:	
1. Increase pocket parks as needed through strategic purchase of adjacent land	NEW POLICY at the DISTRICT scale provided by the PLANNING AND PARKS departments
2. Include amenity spaces within multi-family developments.	NEW POLICY at the PARCEL scale provided by the PLANNING AND PARKS departments
3. Extend Surrey's current pocket park policy (from City Centre) into this area.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING AND PARKS departments
4. Increase shared outdoor spaces in "work" areas by requiring green spaces as part of commercial and industrial development.	NEW POLICY at the PARCEL scale provided by the PLANNING AND PARKS departments

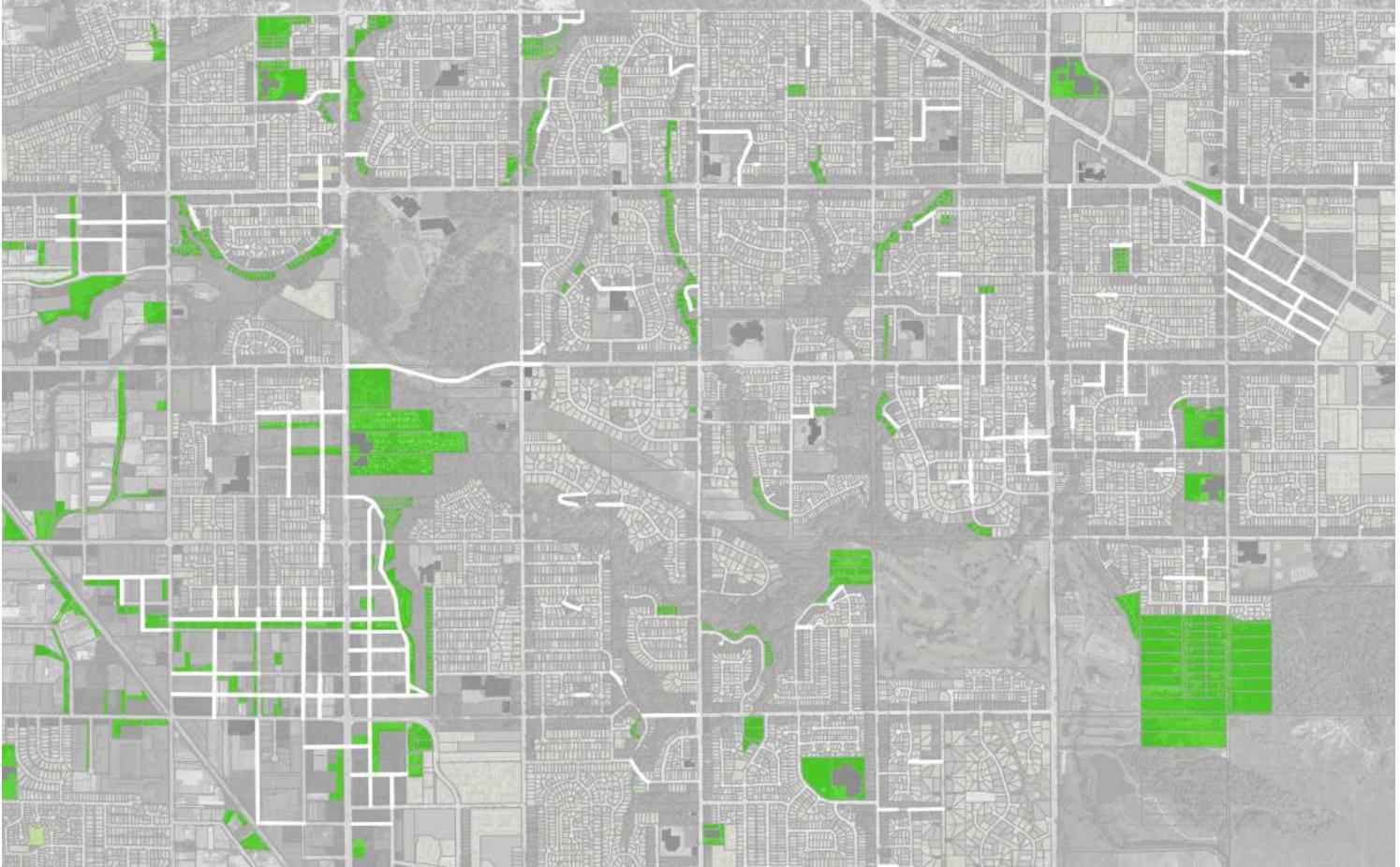
Strategy Three:

**NEW STREAM CROSSINGS:** Fund and develop pedestrian and bike bridges over streams that provide access to nature in a manner respectful to riparian protection.

Supporting Actions & Policies:	
1. Add pedestrian and cycling bridges on the arterial grid where road connections are not possible.	NEW POLICY at the STREET scale provided by the PLANNING, ENGINEERING, AND PARKS departments
2. Require clear span crossings on future road upgrades and refer to subdivision servicing guidelines for important ecological connections.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments

## New green spaces

Accommodating a doubled population in a fixed area should not imply dramatically lower levels of access to green space and amenity. The key is to increase access to existing green spaces while creating a variety of additional parks distributed across the study area.



### LEGEND

 New park lands

### New parks

The plan above identifies new or altered roads in white and new park space in green. While acquiring new park space in already built up areas is difficult there are opportunities, particularly along stream corridors. By strategically targeting density bonuses to key areas, it should be possible to acquire, over time, enhanced public visibility and access to natural areas. Funds for acquisition can come from development cost charges associated with the additional 30,000 units assumed in this plan.

## GREEN Objective Two

Protect and enhance Surrey's groundwater and aquatic ecosystems through green infrastructure and eliminate the negative consequences of stormwater run-off on receiving streams.

### Strategies & Actions

Strategy One:

**RIPARIAN SETBACKS:** Augment riparian setbacks along watercourses throughout the study site, with a particular focus on achieving wider riparian setbacks and public amenity in single family areas adjacent to riparian areas.

Supporting Actions & Policies:	
1. Assign and update the Land Development Guidelines for riparian setbacks to Engineering-Environmental requirements.	NEW GUIDELINE at the PARCEL scale provided by the PLANNING AND ENGINEERING departments
2. Create a land use mechanism such as a Development Permit Area (environmental) for single family areas adjacent to riparian areas in order to augment riparian setbacks.	NEW ZONING at the DISTRICT scale provided by the PLANNING department
3. Adjust Development Permit Guidelines to augment riparian setbacks in areas other than single family residential areas.	UPDATE GUIDELINES at the PARCEL scale provided by the PLANNING AND PARKS departments
4. Implement Riparian Area Development Permit regulations based on enhanced Land Development Guideline standards to reclaim private lot areas intruding into riparian areas.	NEW POLICY at the PARCEL scale provided by the PLANNING AND PARKS departments

Strategy Two:

**SITE INFILTRATION:** Require on-site biofiltration and treatment with re-development.

Supporting Actions & Policies:	
1. Enhance the OCP Development Permit Guidelines and the Zoning Bylaw for Industrial/Commercial/Business Park zones to enable enhanced outdoor amenity space provision, tree canopy protection, on-site storm water management and site permeability.	UPDATE GUIDELINES at the DISTRICT scale provided by the PLANNING AND PARKS departments
2. Create new low-impact development and drainage requirements for infill development.	NEW POLICY at the PARCEL scale provided by the PLANNING department

## Face the Green

A key signature of the study site is the network of stream systems running through it. Currently, development faces away from the stream corridors and often pollutes the streams through stormwater run-off. The charrette team used redevelopment as an opportunity to “face the green” within the study site.



*image credit: Jennifer Marshall*

### **Face the Green**

As infill occurs within the neighbourhood, use the additional development revenue to augment riparian setbacks along the site's stream corridors. These lands can be used to enhance the aquatic ecosystem, and can also provide additional recreational space for the area's residents.

## GREEN Objective Three

Maintain and enhance the existing tree canopy, including the urban forest, street trees and trees on private land.

### Strategies & Actions

Strategy One:

**URBAN FOREST:** Increase the Urban Forest by increasing the number of trees on public and private land.

Supporting Actions & Policies:	
1. Adopt a tree canopy coverage target for the city informed by a detailed tree canopy study.	NEW STUDY at the DISTRICT scale provided by the PLANNING AND PARKS departments
2. Develop on-site design guidelines for tree coverage percentages for all zones.	NEW GUIDELINE at the PARCEL scale provided by the PLANNING department
3. Develop requirements to maintain native soil depths and soil profiles to ensure health of urban forest.	NEW GUIDELINE at the PARCEL scale provided by the PLANNING department
4. Enhance tree protection bylaw areas, increase and enforce penalties and fees.	UPDATE BYLAW at the PARCEL scale provided by the PLANNING department
5. Create 'Parking Lot Design Guidelines' to require a percentage of tree canopy coverage on surface parking lots.	NEW GUIDELINE at the PARCEL scale provided by the PLANNING department
6. Enhance school ground tree canopy coverage percentage.	UPDATE POLICY at the PARCEL scale provided by the PLANNING department
7. Develop plans for planting and succession enhancement of un-forested parks and natural spaces.	NEW POLICY at the DISTRICT scale provided by the PARKS department

Strategy Two:

**GREEN STREETS:** Create "Green" Streets

Supporting Actions & Policies:	
1. Amend Engineering Design Guidelines for roads to include green streets. Update Engineering R91 Road Network Allowance Plans as necessary.	UPDATE GUIDELINE at the PARCEL scale provided by the ENGINEERING department
2. Establish and implement a Green Street Network Plan, identifying priority streets for rainwater management (R71 Plan changes).	NEW PLAN at the DISTRICT scale provided by the ENGINEERING department
3. Create 'roadway standards' for significant natural corridor communities in subdivision servicing standards.	NEW STANDARD at the STREET scale provided by the PLANNING AND ENGINEERING departments
4. Expand the Green Leaf program for local streets including education and planting programs on front yards and unplanted city right-of-ways.	NEW PROGRAM at the PARCEL scale provided by the SUSTAINABILITY AND ENGINEERING department

## Tree Canopy Coverage

Adding new population to any area can add stress on natural systems. The charrette team addressed this by assuming new development would be held to higher green standards than is currently the case. The use of natural infrastructure such as tree canopies and pervious surfaces on existing streets can enhance existing ecological conditions rather than compromising them.



*image credit: Daniel Roehr*

### **Urban Forest**

A key strategy for enhancing livability while increasing density is to ensure that the urban forest is complete and healthy. Canopy trees need space to grow and sufficient soil depths to thrive. Roadway standards and zoning requirements need to accommodate canopy trees.

## GREEN Objective Four

Design neighbourhoods to conserve and reduce energy demand, while incorporating alternative fuel and renewable energy sources, such as district heating systems, wherever practical.

### Strategies & Actions

Strategy One:

**DISTRICT ENERGY:** Find ways to promote and incentivize District Energy systems.

Supporting Actions & Policies:	
1. Develop economic incentives for District Energy, including: reducing Development Cost Charges, creating special utility rates, reducing property taxes, and/or expediting application processes.	NEW POLICY at the PARCEL scale provided by the SUSTAINABILITY department
2. Formalize a heat source plan with thermal energy data.	NEW STUDY at the PARCEL scale provided by the SUSTAINABILITY department

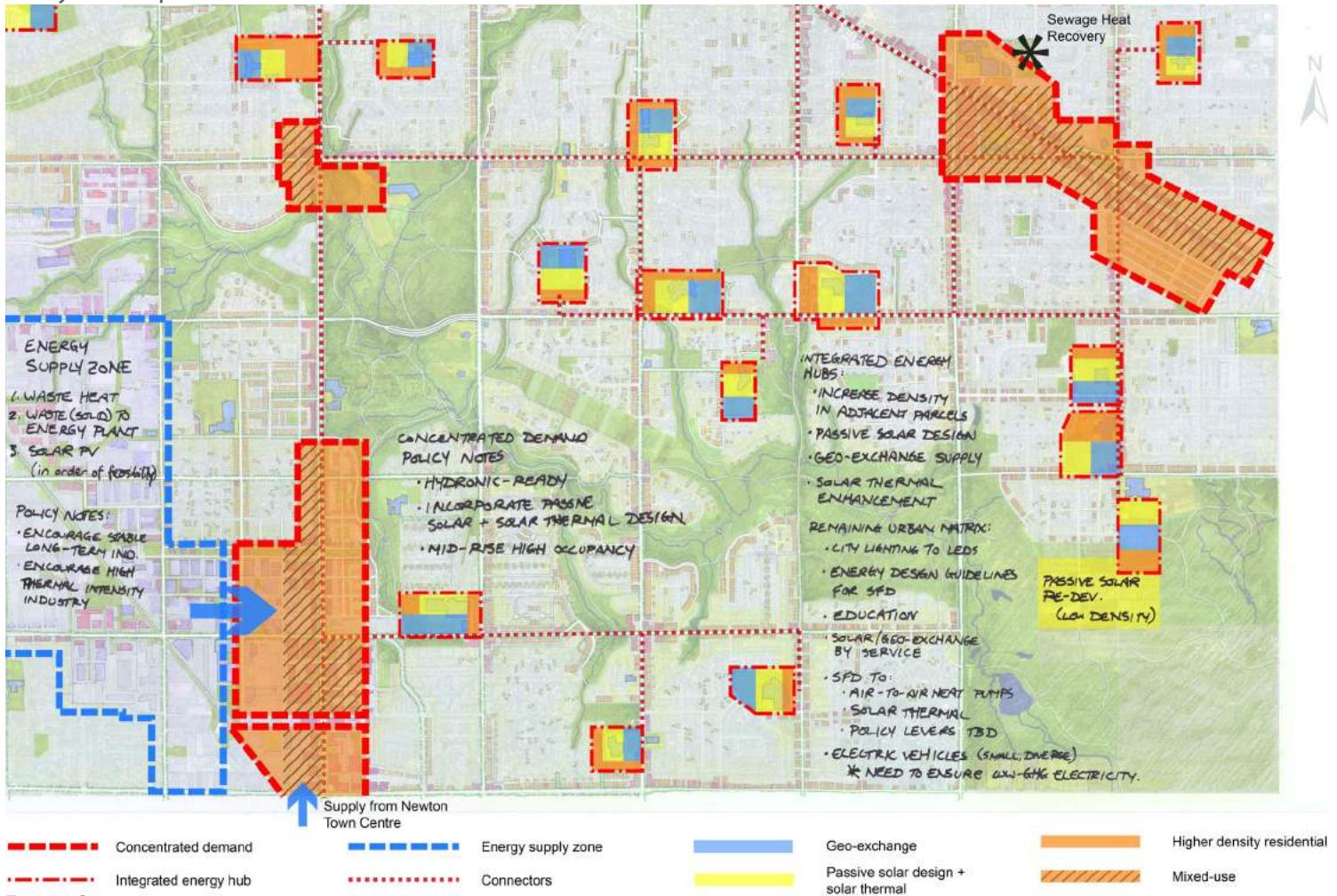
Strategy Two:

**DISTRICT ENERGY LOCATION:** Allow for energy sharing on industrial land and other appropriate locations for District Energy systems with suitable land-use mixes and densities.

Supporting Actions & Policies:	
1. Designate high density growth areas as District Energy service areas (eg. along Fraser Highway and King George Boulevard).	NEW ZONING at the DISTRICT scale provided by the SUSTAINABILITY AND PLANNING departments
2. Partner with the Surrey Schools to identify school sites appropriate for district energy upgrades, such as geo-exchange and other renewable energy systems.	NEW STUDY at the PARCEL scale provided by the SUSTAINABILITY AND PLANNING departments
3. Require installment of geo-exchange, or other renewable energy systems, in future community centers adjacent to high schools to share energy with surrounding development.	NEW POLICY at the PARCEL scale provided by the SUSTAINABILITY AND PLANNING departments
4. Direct redevelopment and densification near school sites to utilize geo-exchange systems implemented on school sites.	NEW POLICY at the PARCEL scale provided by the SUSTAINABILITY AND PLANNING departments

## District Energy

A community that uses energy wisely is a more resilient community. As density increases new options for energy use and distribution emerge. The most promising opportunity for the study site is district energy. District energy systems are being installed at Surrey City Center. In time they will likely be installed in Newton Town Centre. The industrial area and the Fernwood area in the study site are the next logical candidates. In order to incentivise such District Energy systems (DE), it is important to create the appropriate policies and conditions to foster supporting land use mixes, densities and DE-ready development utilities.



### Energy Systems

Two scales of energy systems have been envisioned for the area. Larger DEs can be accommodated in the emerging Transit Villages along Fraser Hwy and King George Blvd. They will have an appropriate mix of uses, density, and new development. These nodes could eventually extend along their respective corridors, serving a wider catchment as new DE ready developments take advantage of the system initiated in these anchors. Within the neighbourhood fabric, school sites can serve as smaller scale neighborhood heating systems. Eventually all of these separate systems can be economically linked with pipes installed on arterial roads (as shown dashed red lines)

## GREEN Objective Five:

Produce community designs and regulations to reduce impact from waste generated by the community.

### Strategies & Actions:

Strategy One:

**WASTE TO ENERGY GENERATION:** Provide plants to generate electricity and in turn waste to heat.

Supporting Actions & Policies:	
1. Study alternative options for energy plants and provision of heat recovery for use.	NEW STUDY at the PARCEL scale provided by the SUSTAINABILITY department
2. Develop policy around effective use of bio-waste and agriculture waste digesters to provide energy to industrial areas.	NEW POLICY at the PARCEL scale provided by the SUSTAINABILITY department
3. Assess feasibility of an anaerobic digester for creating biogas from agriculture and/or food waste.	NEW STUDY at the PARCEL scale provided by the SUSTAINABILITY department

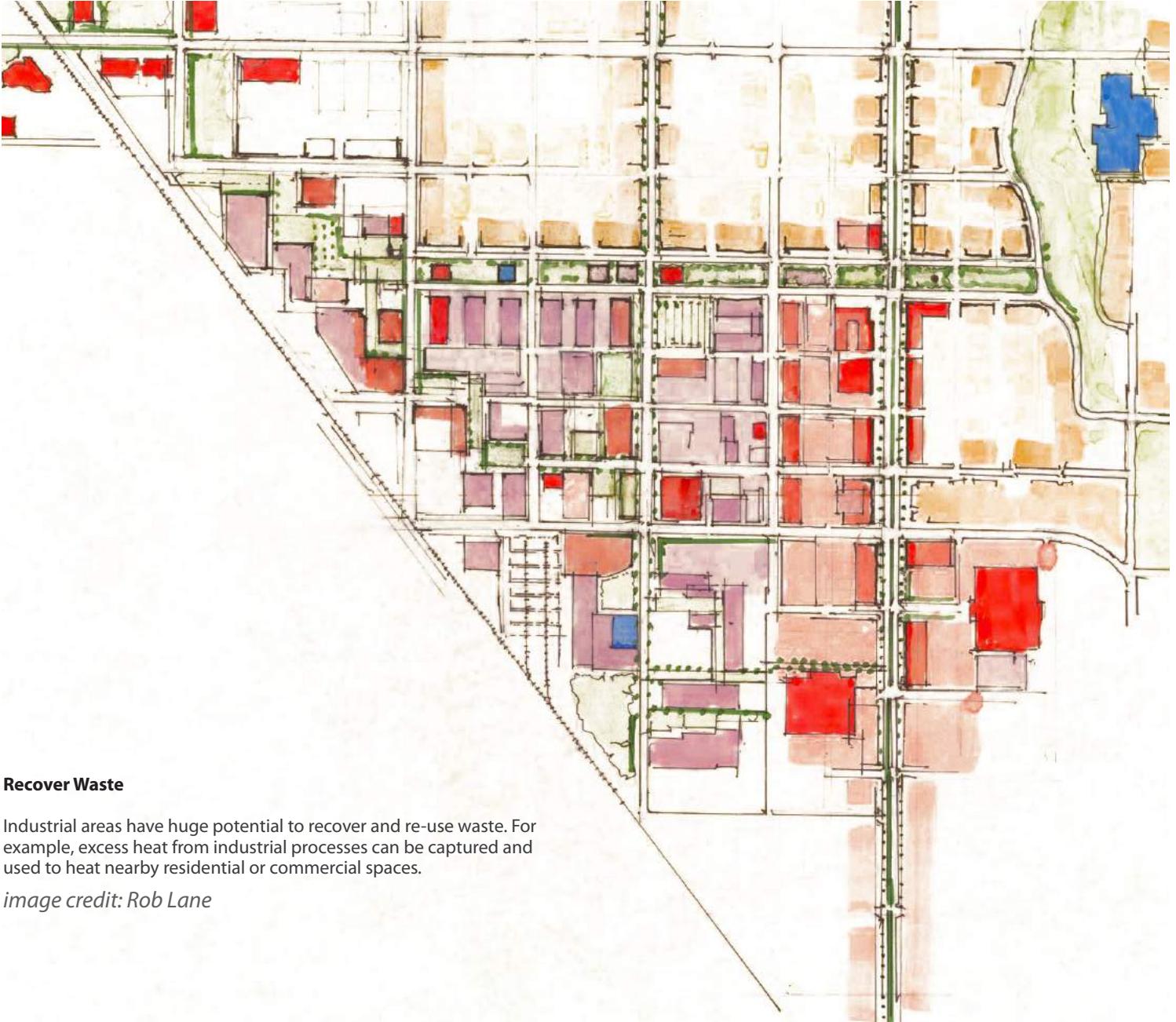
Strategy Two:

**WASTE RECOVERY:** Create a suite of green waste recovery programs.

Supporting Actions & Policies:	
1. Create regulations for better sorting of demolition and construction waste.	NEW POLICY at the DISTRICT scale provided by the SUSTAINABILITY department
2. Reinforce and enhance economic policies to allow for waste recovery enterprises.	UPDATE POLICY at the DISTRICT scale provided by the SUSTAINABILITY department
3. Accommodate green waste facilities in industrial areas.	NEW POLICY at the PARCEL scale provided by the SUSTAINABILITY department
4. Prioritize and extend the green waste recovery program (starting 2013 for single family areas) to higher density residential areas.	UPDATE PROGRAM at the DISTRICT scale provided by the SUSTAINABILITY department
5. Create regulations to reduce plastic use within the municipality.	NEW PROGRAM at the DISTRICT scale provided by the SUSTAINABILITY department
6. Establish and extend vermicomposting programs.	NEW PROGRAM at the DISTRICT scale provided by the SUSTAINABILITY department

## Reduce Waste

One man's waste is another man's resource. The eco industrial concept assumes waste energy and materials can be profitably used by other enterprises. The large industrial area within the study site can potentially be the Lower Mainland's first eco industrial site.



## Recover Waste

Industrial areas have huge potential to recover and re-use waste. For example, excess heat from industrial processes can be captured and used to heat nearby residential or commercial spaces.

*image credit: Rob Lane*

## GREEN Objective Six:

Promote and sustain agriculture and enhance local food systems security by maximizing the utility of the ALR, and expanding the opportunities for urban agriculture at all scales.

### Strategies & Actions:

Strategy One:

**COMMUNITY SCALE AGRICULTURE:** Provide opportunities for community-scale agriculture and ancillary businesses.

Supporting Actions & Policies:	
1. Allow temporary use permits on vacant properties for small-scale agricultural activities.	NEW ZONING at the PARCEL scale provided by the PLANNING department
2. Encourage community gardens on public land.	NEW PROGRAM at the PARCEL scale provided by the SUSTAINABILITY, PLANNING AND PARKS departments
3. Facilitate permitting of market gardens on both public and private land.	NEW ZONING at the PARCEL scale provided by the PLANNING AND PARKS departments
4. Change regulations for vertical and rooftop farms on industrial land and other suitable locations.	UPDATE BYLAW at the PARCEL scale provided by the PLANNING department

## Local Food

Communities are more ecologically rich and economically resilient if food is a part of the plan. Given city and citizen interest in community farming, the plan includes ideas for urban farming at different scales, while opening up options for new jobs in the agricultural sector.



### Local Food

Different scales of local food production can occur in the study site. The Agricultural Land Reserve adjacent to the site provides the most obvious large scale agricultural opportunities. Smaller scale food production can occur both within the BC Hydro ROW, cutting through the site, as well as local community farming at neighbourhood school sites and parks. The food produced in the area could be sold in local food markets along community hubs, strengthening the economic feasibility of these practices.

## GREEN Objective Seven

Provide recreation and social opportunities through an interconnected network of parks, public spaces, trails, greenways.

### Strategies & Actions

Strategy One:

**DISTRICT PARKS:** Expanded Bear Creek Park with new cultural and recreational facilities.

Supporting Actions & Policies:	
1. Develop plans to add new cultural facilities to Bear Creek Park, particularly near the King George Blvd portion of the park.	NEW ZONING at the PARCEL scale provided by the PLANNING AND PARKS departments
2. Increase access to major public parks such as Bear Creek (this will require negotiation with the Department of Fisheries and Oceans DFO about appropriate stream crossings).	NEW POLICY at the PARCEL scale provided by the PLANNING AND ENGINEERING departments

Strategy Two:

**COMMUNITY PARKS:** Locate Community Parks adjacent to and within Urban Villages (see Community Objective One). These are more “urban” in scale and design.

Supporting Actions & Policies:	
1. Ensure that new Urban Villages include community park spaces, such as public plazas, for gathering.	NEW ZONING AND NEIGHBOURHOOD CONCEPT PLAN at the DISTRICT scale provided by the PLANNING AND PARKS departments

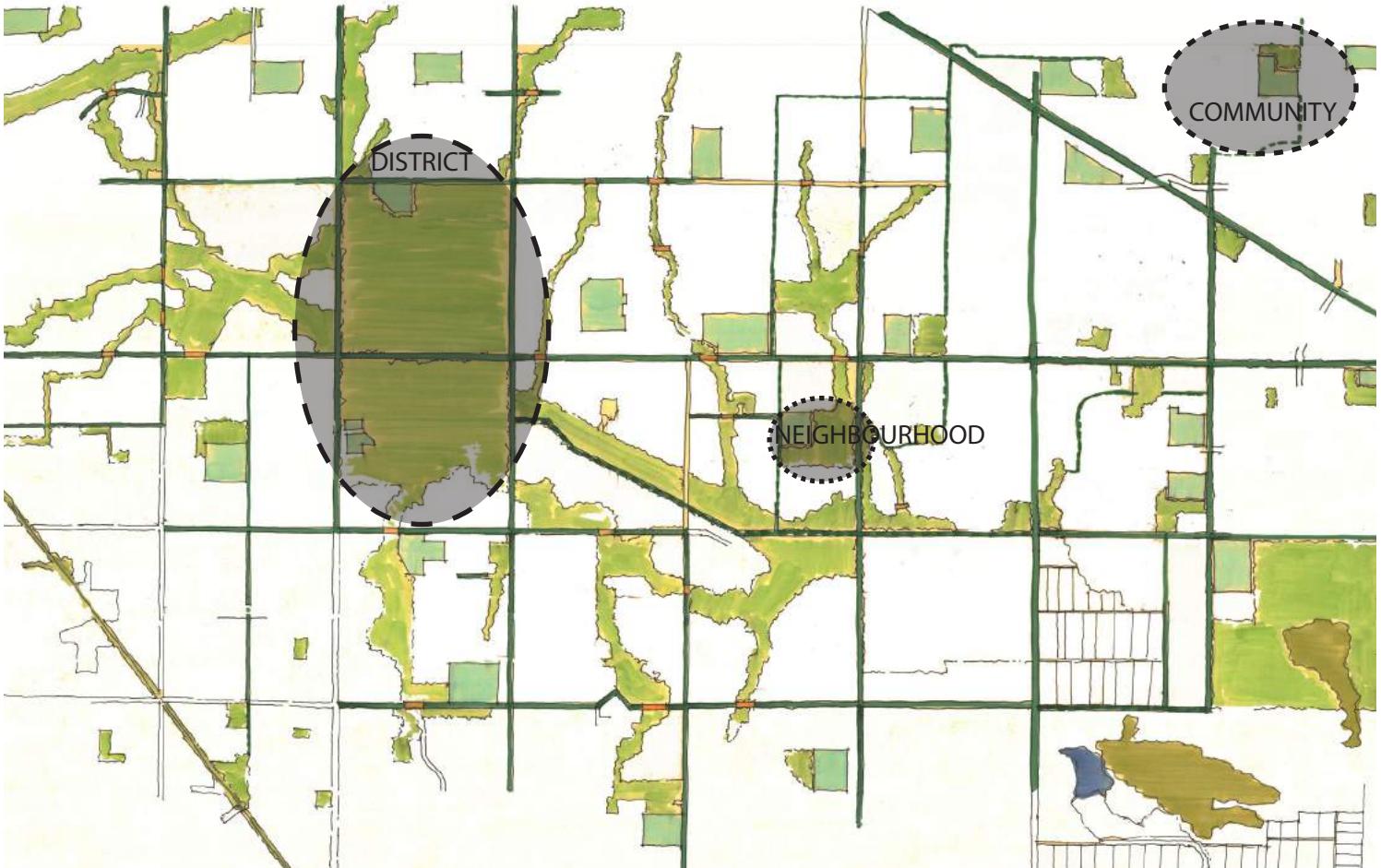
Strategy Three:

**NEIGHBOURHOOD PARKS:** Locate Neighbourhood parks on or directly adjacent to existing school sites. This includes providing new spaces for cultural activities in and around Neighbourhood Villages.

Supporting Actions & Policies:	
1. Identify and designate neighbourhood gathering places around schools. Co-locate parks and community facilities with identified schools.	NEW PROGRAM at the DISTRICT scale provided by the PLANNING AND PARKS departments
2. Create partnerships with Surrey Schools regarding the expansion of community uses within school lands.	NEW PROGRAM at the PARCEL scale provided by the PLANNING department
3. Revise practices and policies related to locating facilities in City parks to allow for a wider variety of community uses.	UPDATE ZONING AND POLICY at the PARCEL scale provided by the PLANNING AND PARKS departments

## Three scales of parkland

Surrey prides itself on its plentiful parkland. A key challenge for the charrette was preserving and enhancing existing parkland while increasing population and jobs within the study site. The charrette team divided parkland into three categories: District, Community, and Neighbourhood scales, and came up with strategies and actions to enhance parkland at all three scales. In sum, these strategies are united by an intention to enhance the role of parks at all scales in the civic life of citizens.



### Three Scales of Parkland

Bear Creek Park is a large District scale park serving the study site. Community parks serve the new Urban Villages within the study site. Neighbourhood parks locate near schools and serve adjacent residences.

## GREEN Objective Eight

Reduce water consumption by families, businesses and community facilities, while remediating waste water.

### Strategies & Actions

Strategy One:

**WATER CONSERVATION EDUCATION AND INCENTIVES:** Provide education campaigns and incentives for water conservation, such as irrigation regulations, rainwater collection on-site for summer irrigation, bioswales and raingardens on-site for self watering.

Supporting Actions & Policies:	
1. Initiate education campaigns on water consumption targeted to a variety of audiences.	NEW PROGRAM at the DISTRICT scale provided by the SUSTAINABILITY department
2. Create design guidelines for on-site groundwater recharge to reduce the need for watering.	NEW GUIDELINES at the PARCEL scale provided by the PLANNING department
3. Establish water metering and watering restrictions.	NEW PROGRAM at the PARCEL scale provided by the SUSTAINABILITY, PLANNING AND ENGINEERING departments
4. Promote water harvesting (eg. create a rainbarrel program) and promote greywater use (eg. purple pipe programs).	NEW PROGRAM at the PARCEL scale provided by the SUSTAINABILITY AND ENGINEERING departments

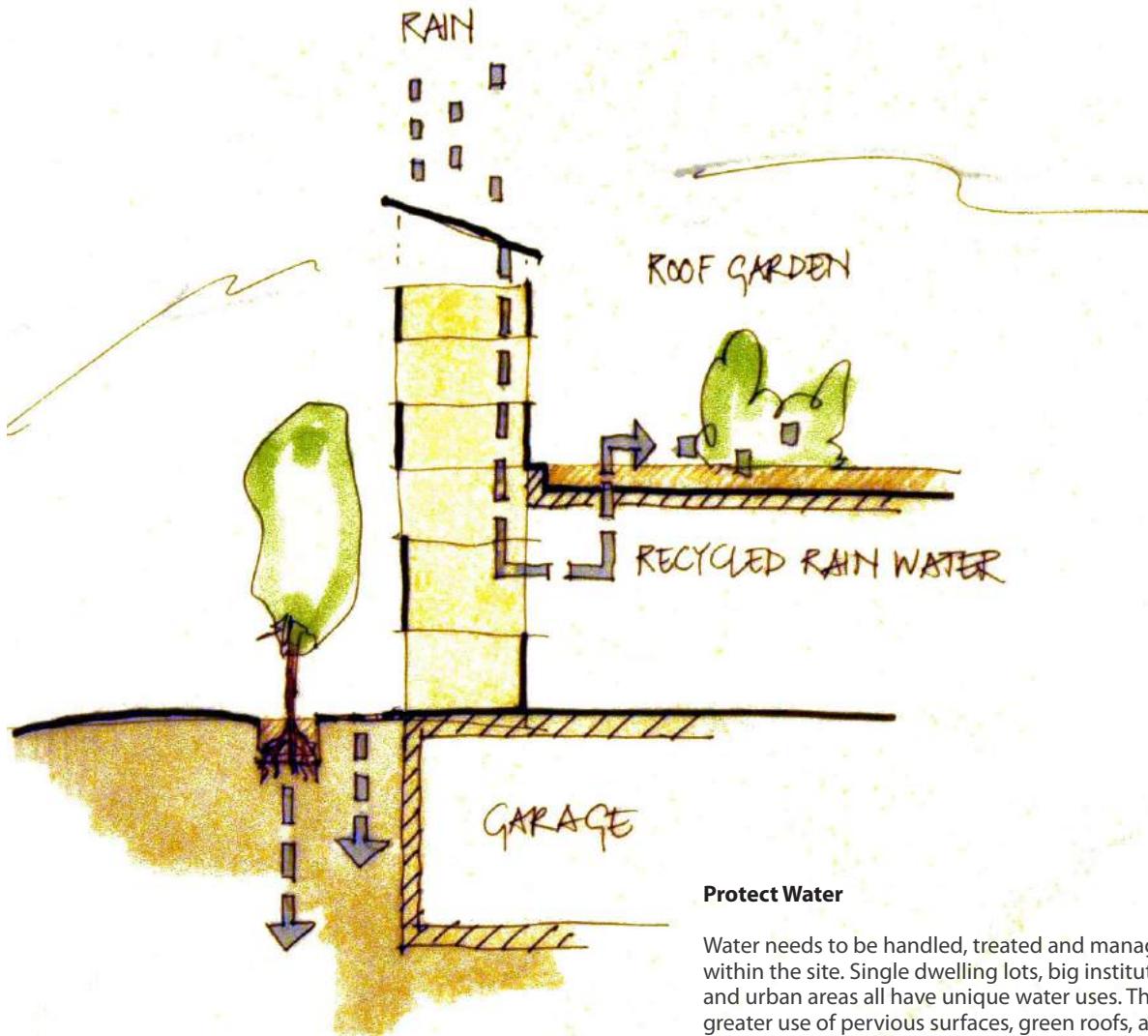
Strategy Two:

**RIPARIAN REGULATIONS:** Use a variety of tools to protect riparian areas from the negative consequences of stormwater run off.

Supporting Actions & Policies:	
1. Consider a Green Infrastructure levy on utility bills.	NEW POLICY at the DISTRICT scale provided by the SUSTAINABILITY department
2. Adopt and revise the City Centre stormwater management requirements in new infill areas.	UPDATE POLICY at the DISTRICT scale provided by the PLANNING AND ENGINEERING departments
3. Enhance riparian areas through utilization of development funds.	NEW POLICY at the DISTRICT scale provided by the PLANNING AND PARKS departments
4. Lobby the Provincial Government for more flexible Development Cost Charges (DCC) authority.	NEW POLICY at the DISTRICT scale provided by the PLANNING department

## Protect Water

The ecological function of the Bear Creek watershed has already been compromised by damaging storm water management systems. These systems, installed in the decades prior to 1990, do great damage to receiving streams. New requirements for infill should, over time, mitigate this damage, and enhance the streams for recreation and wildlife. Key to this will be requirements for new development to hold and infiltrate storm water on site.



### Protect Water

Water needs to be handled, treated and managed at different scales within the site. Single dwelling lots, big institutional lands, district parks and urban areas all have unique water uses. The charrette plan calls for greater use of pervious surfaces, green roofs, and rain water collection systems. These are combined with efficient water use in residential, commercial and industrial lands.

*image credit: Daniel Roehr*

## GREEN Objective Eight (continued)

Reduce water consumption by families, businesses and community facilities, while re-mediating waste water.

### Strategies & Actions (continued)

Strategy Three:

**APPROPRIATE PLANTING:** Promote appropriate plant species selection.

Supporting Actions & Policies:	
1. Encourage planting native species and removal of invasive species on both public and private land.	NEW GUIDELINES at the PARCEL scale provided by the PLANNING department
2. Increase use of compost in public spaces to increase water retention and decrease need for watering.	NEW PROGRAM at the PARCEL scale provided by the PARKS department
3. Develop guidelines on zeriscaping and drought tolerant species selection.	NEW GUIDELINES at the PARCEL scale provided by the PLANNING department

## Reduce Irrigation

Irrigation can account for a large percentage of a community's water use. Planting drought-tolerant and native plants reduces the need for irrigation of ornamental landscapes. Native plants also support local fish, bird, and other wildlife species.



*image credit: Neda Roonia*

### **Appropriate planting.**

The riparian corridors and the Hydro right-of-way for electric transmission running through the site can be better used as an ecological asset. Removing invasive plant species and re-introducing of native plant communities is an important first step.





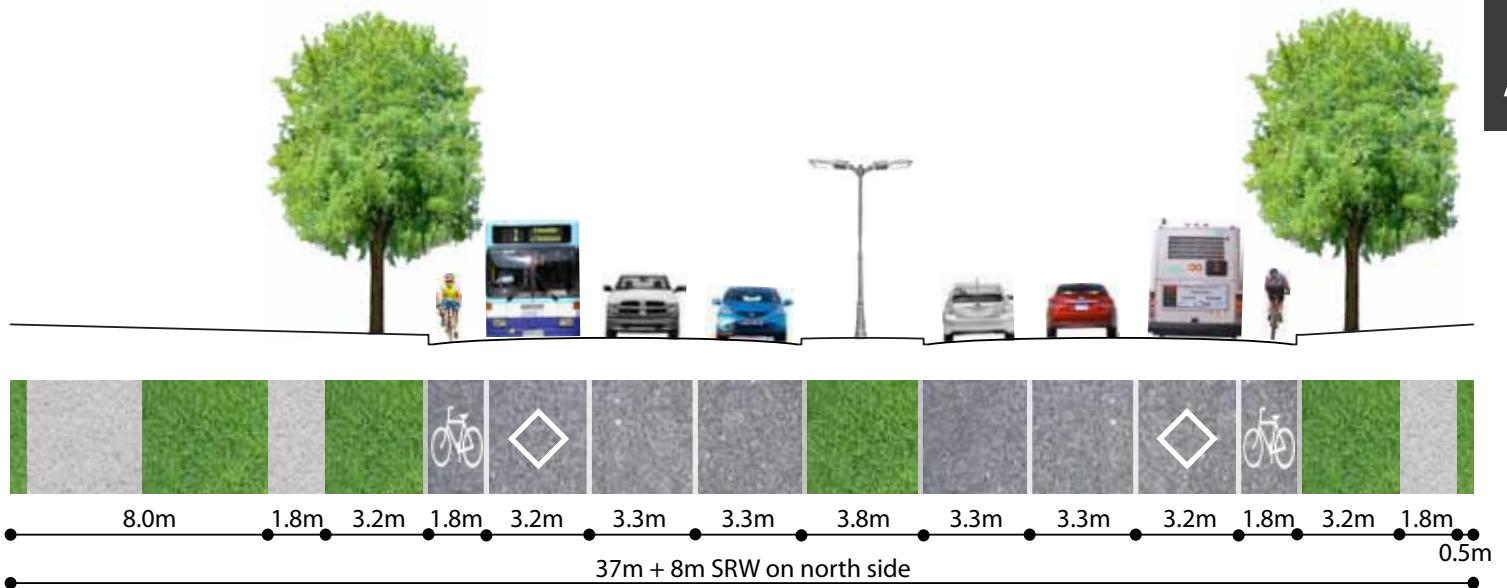
## Road cross sections

The City of Surrey has completed work on standardizing road cross sections. The charrette team examined these sections to suggest how they might be enhanced to meet the objectives of the charrette: pedestrian and cyclist safety and comfort, improved drainage, better tree growth, and support for transit-oriented land uses. The suggested amendments for future consideration are shown here. First, consider placing bike paths on major arterials in the pedestrian zone rather than the motorized vehicle zone. This is a practice that is employed in Europe and attracts less aggressive riders to use their bikes. Second, revise street sections to enhance storm water infiltration, using boulevards and medians on busy arterials as infiltration zones/rain gardens. Third, on residential streets, gradually replace impervious pavement with pervious pavement. Fourth, allow greater space for canopy trees. Fifth, bring buildings closer to the lot line, and widen sidewalks, to increase parcel utility and enhance the pedestrian realm.

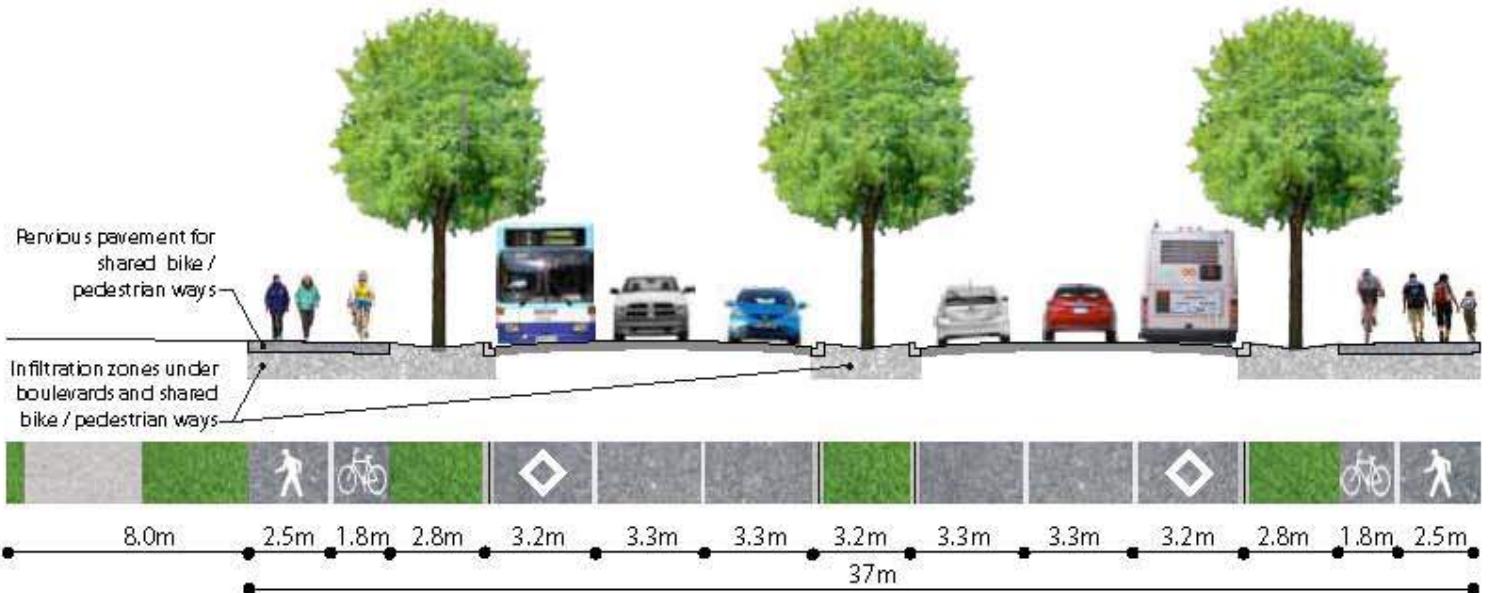
*note: the proposed sections on the following pages are not approved as City standards, and are shown as proposal illustrations only*

# Existing 6-lane Arterial

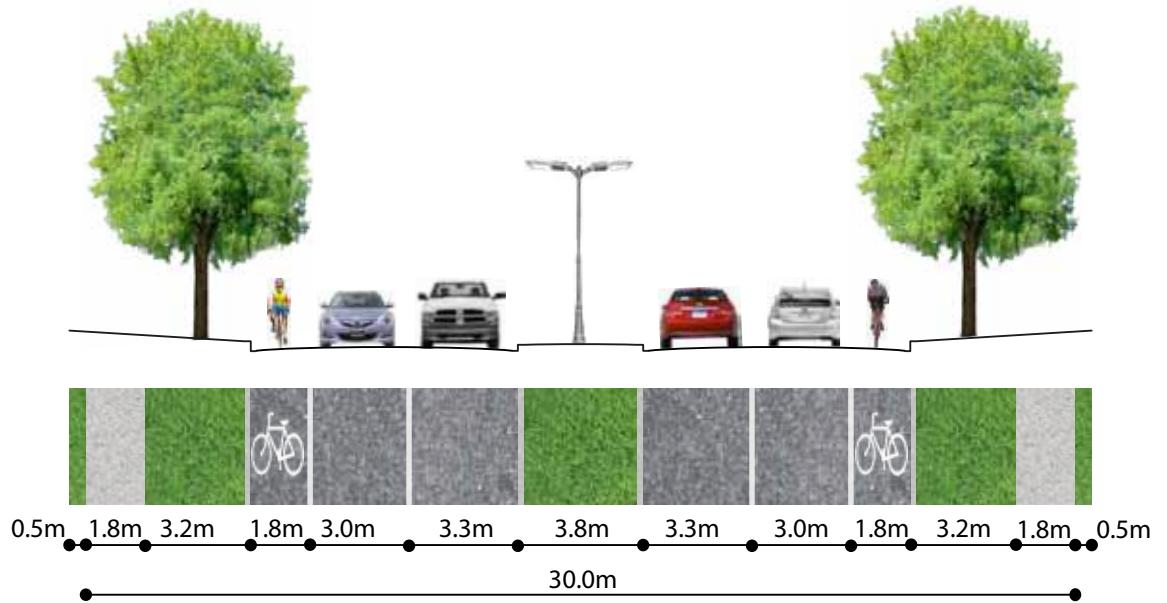
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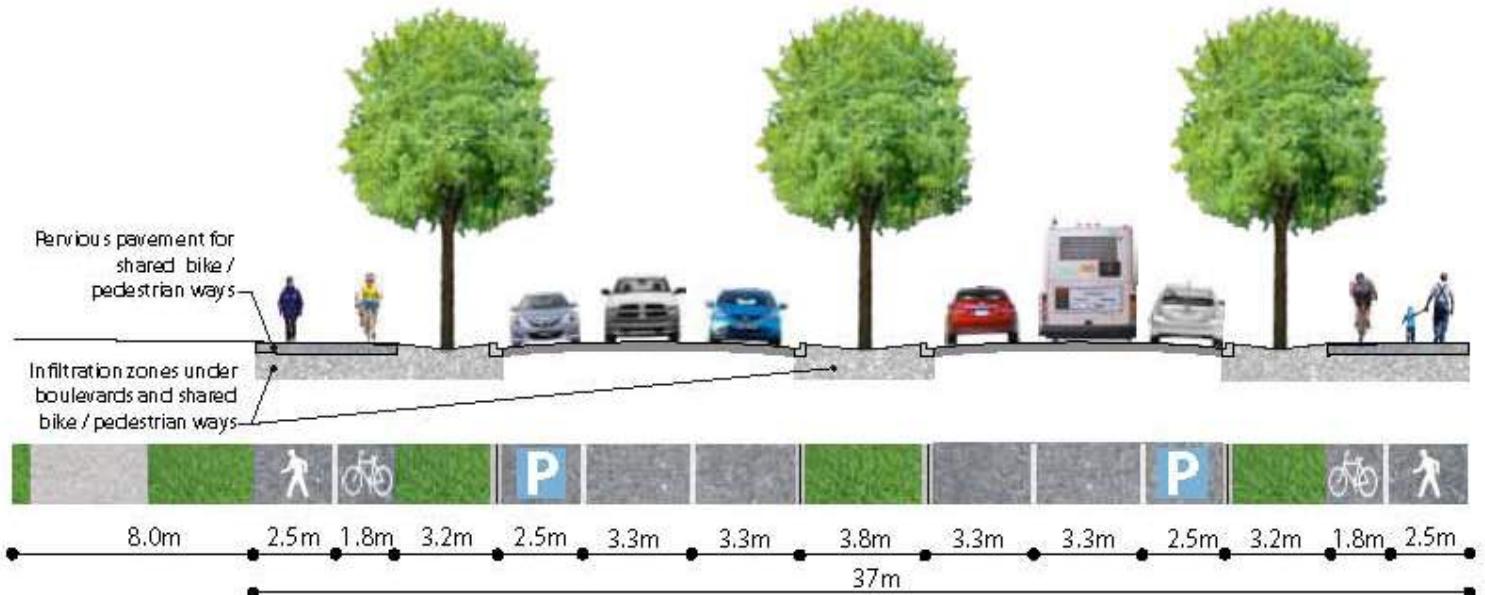
# Proposed Green Street and Safe Bike Alternative



# Existing 4 Lane Arterial

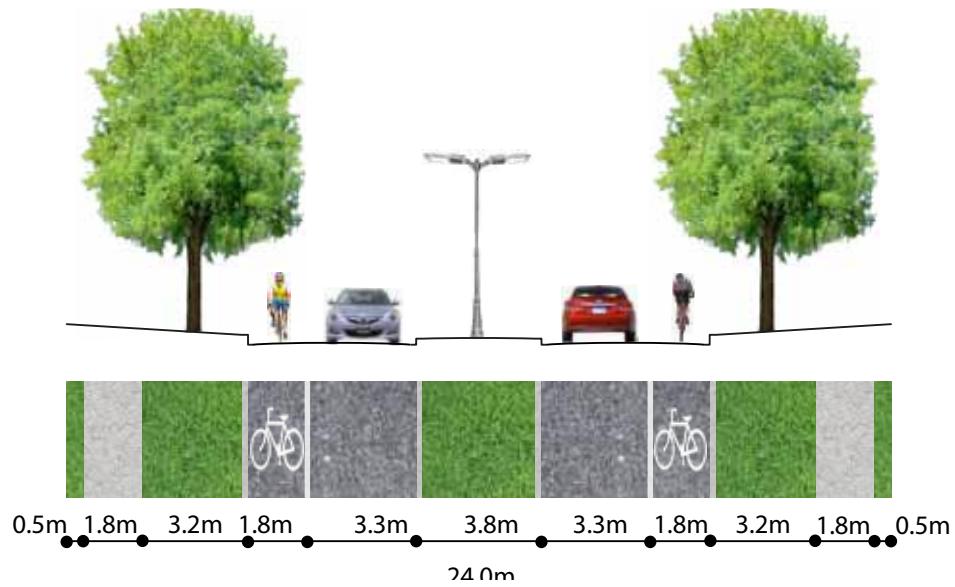


# Proposed 4-Lane Green Arterial with Parking

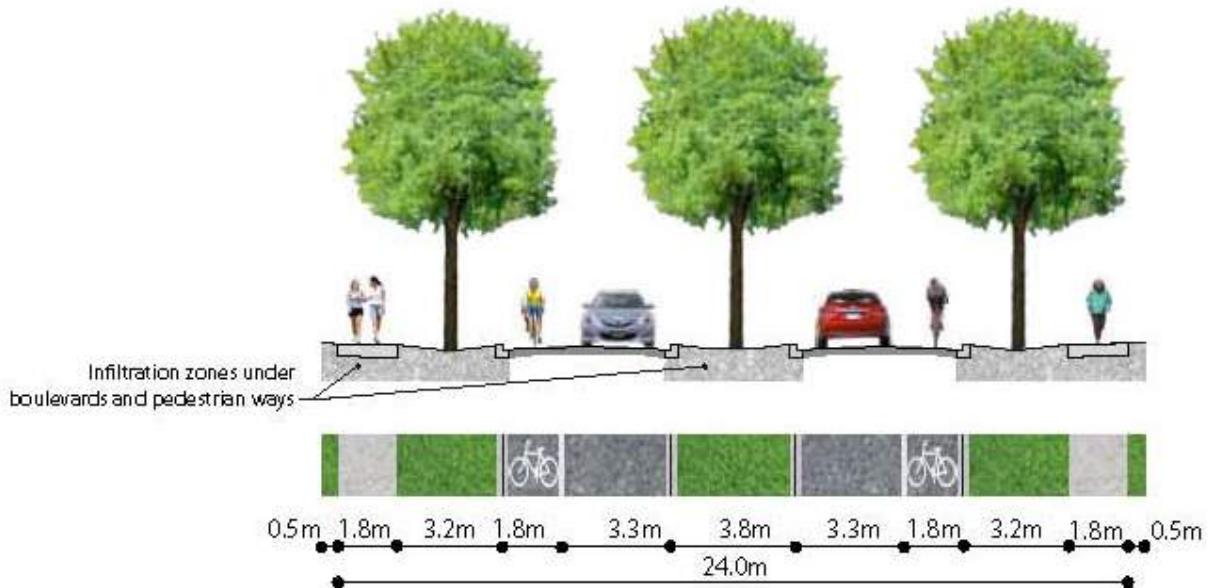


# Existing Collector Road

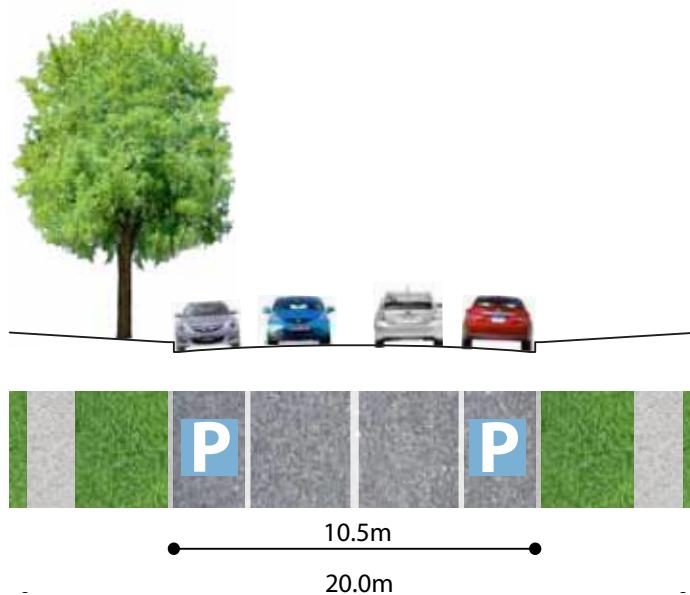
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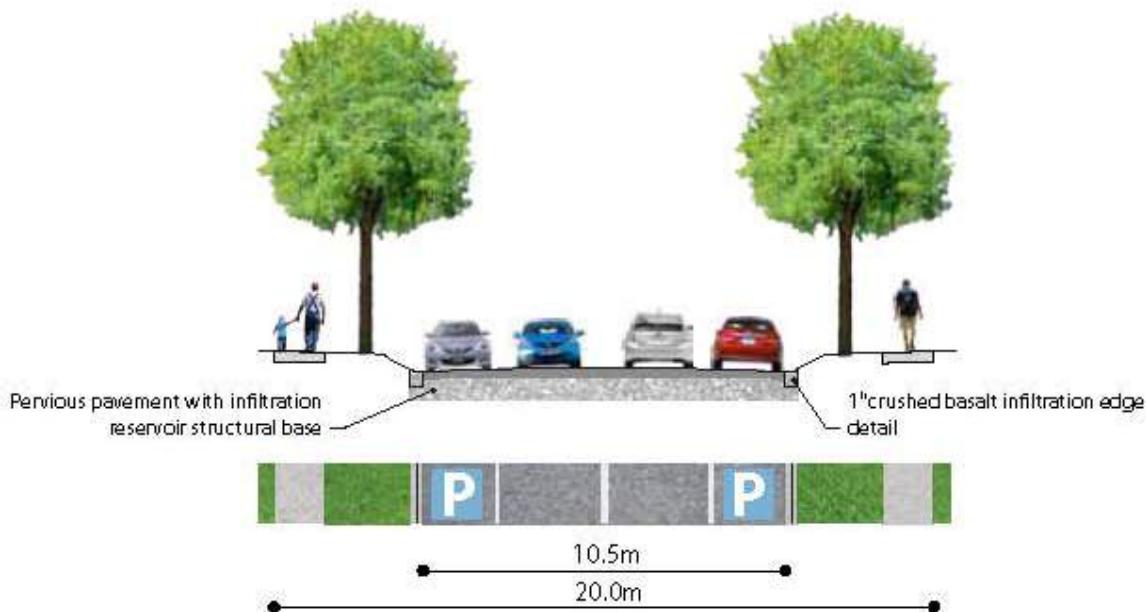
# Proposed Collector Road



# Existing 20m Local Road

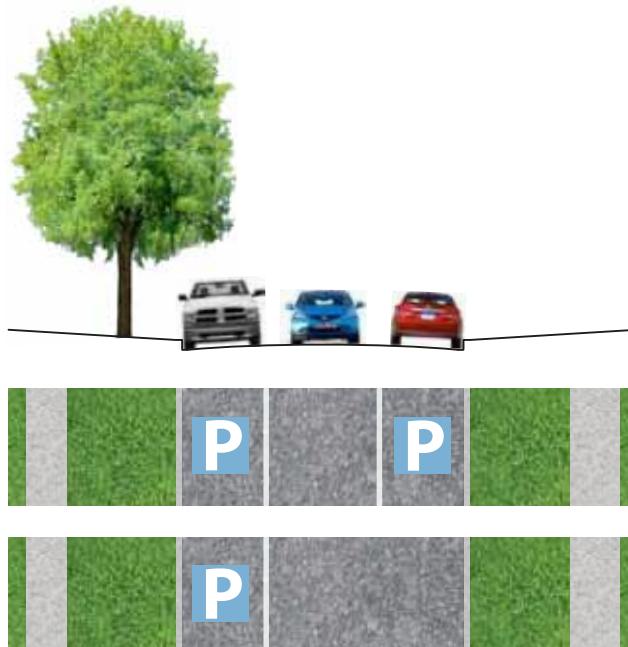


# Proposed 20m Local Road

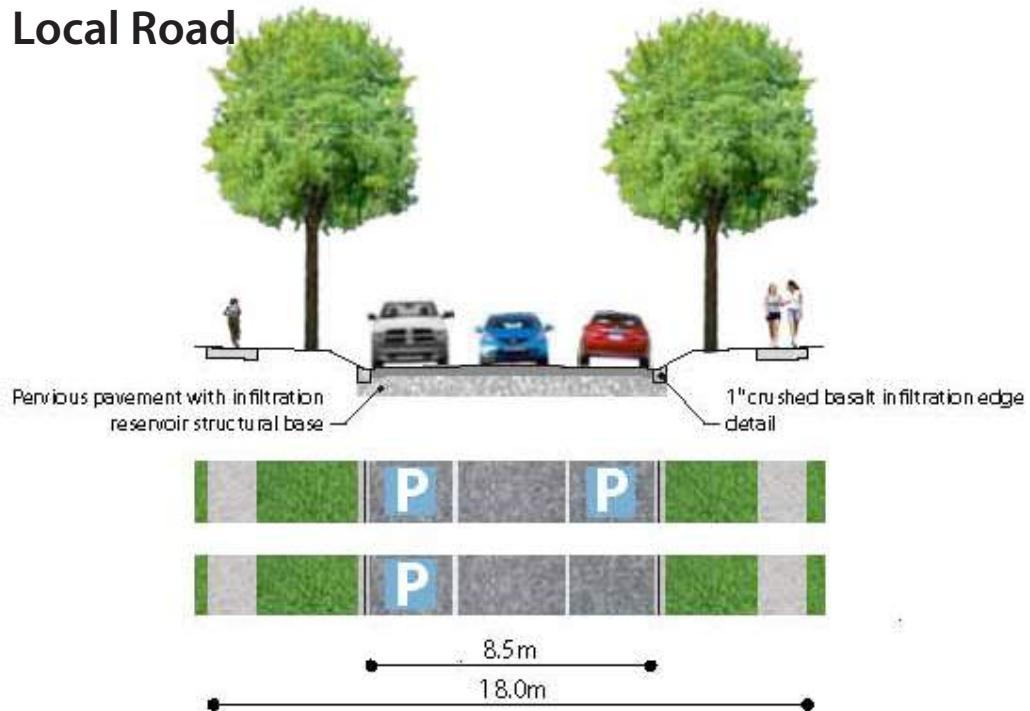


# Existing 18m Local Road

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# Proposed 18m Local Road

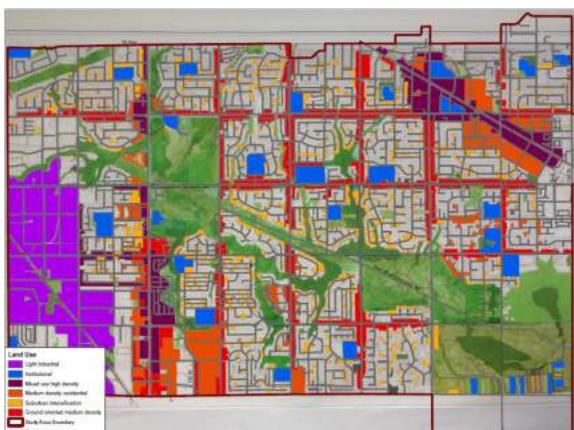




**Baseline Conditions 2010**



**Sensitive Infill Charrette Design Outcome for 2060**



**Sensitive Infill Digitization for modelling**

## Measuring Energy and Greenhouse Gas Emissions

In order to conduct this analysis, the site’s current estimated emissions portfolio was measured by consultants from HB Lanarc Golder, serving as the baseline for the plan’s evaluation and a status-quo projections scenario. Subsequently, the strategies suggested in the Charrette were incorporated into HB Lanarc Golder’s models, through digitization of the physical plan, providing an alternative ‘infill’ scenario for the future of Surrey with a different projected development trajectory (see figures at left).

A detailed breakdown of the changes in the urban pattern and the resulting emissions portfolio can be found below (Table 4).

The ‘Sensitive Infill’ strategies proposed through this Charrette could result in a 57% reduction in per capita GHGs, while accommodating a doubling of the population in the area. This illustrates both the extent to which physical changes in the urban pattern at the city level can contribute to the provincial targets, but also the limitations of such strategies absent of other policy changes at the provincial and federal levels pertaining to building and automobile efficiency requirements. Indeed, the plan makes a significant contribution to the minus 80 percent, target and combined with other forthcoming regulations and requirements by other levels of government, it can put Surrey on a more sustainable development path.

Finally, it is important to note that these positive results come without assuming the benefits which would accrue from expanding the City of Surrey’s district energy system into the study area. Based on previous analysis and assuming that the real cost of energy may double in the next twenty years (in line with the estimates of most analysts from government and energy companies), the extension of an area wide district heating system seems feasible. This would further reduce per capita GHG production, bringing the City closer to its long term goals of an 80% reduction in per capita GHG (aligning with UN Intergovernmental Panel on Climate Change benchmarks).

<b>Emissions Portfolio</b> - adapted from HB Lanarc Golder			
Indicator	2011	Current Plans 2040	Sensitive Infill 2060
Housing Split: Single / TH / LR / HR	88 / 9 / 3 / 0	71/18/10/1	25/30/40/5
Avg Yr of Construction	1987	1998	2017
Avg Energy Intensity (GJ/M2)	0.63	0.55	0.45
Distance To Rapid Transit (km)	4.8	4.5	<b>1.8</b>
Average Distance to "CBD" (km)	14.8	14.0	13.6
Average Population Under 16 (%)	24%	24%	24%
Housing Mix (0 = homog, 1= heterog)	0.09	0.30	<b>0.45</b>
Avg Daily Transit Service Hours	3.0	5.8	7.7
Avg Pop Density (Gross DU/H)	8.6	11.2	27.2
Intersections per Road KM	2.5	4.1	5.1
Ratio of Cycle Routes to Roads	0.27	0.29	0.39
Average Vehicles Per Household	1.50	1.25	1.03
Land Use Mix (Workers:Jobs)	0.20	0.18	0.2
Avg Daily Distance Driven (VKT - km/hh)	55.12	46.5	<b>38.1</b> (30% reduction from 2011)
Avg Daily Transit Ride (PKT - km/hh)	12.19	12.12	12.9
Avg Prsnl Auto GHGs (tCO2e/yr/pop)	1.70	0.60	0.54
Avg Public Trans GHGs (tCO2e/yr/pop)	0.04	0.17	0.16
Avg Total Transpo Emissions per Capita (tCO2e/yr/pop)	1.75	0.77	(-60%) 0.7
Avg Buildings GHGs per Capita	1.81	1.52	(-53%) .87
<b>Avg Total GHGs per Capita (t/CO2e/yr/pop)</b>	<b>3.6</b>	<b>2.29</b>	<b>(-57%) 1.57</b>
Avg GHGs Per Resident& Employee (tCO2e/yr/pop+emp)	2.65	2.10	(-46%) 1.44
Tailpipe Standard (Grams CO2e per VKT)	287	111	111
Building Retrofit Rate (Annual) for Energy Efficiency	1.5%	1.5%	3%
Share of New Construction with Renewable Energy	1%	1%	75%

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# FOUNDATIONAL RESEARCH BULLETIN #1

July 2011

## Implications of Demographic and Social Change on Neighborhood and Housing Form in Surrey, BC

Professor Patrick M. Condon,  
Sam Mohamad-Khany

### 1. GOAL

The goal of this research paper is to highlight how ethnic, cultural, and demographic shifts have implications for neighborhood and housing form within the Surrey Sensitive Infill project's study area.

### 2. INTRODUCTION

The social and economic conditions that gave rise to the post WWII suburbs have changed. An aging demographics and a much more ethnically heterogeneous population will influence development trajectory of former suburbs, with important design implications for the impacted communities.

In North America, an aging baby boomer population coupled with decreasing fertility rates have resulted in smaller family sizes. This has created unique challenges for adapting neighbourhood housing stock, neighborhood design, infrastructure and services (Condon and Belaustequigoitia, 2006). Similarly, an increase in the number of multi-family households (MFH) and/or multigenerational households (MGH) indicates new living patterns have taken hold. These changes are often attributed to the unique family arrangements of immigrants, rising median age of first marriage of all adults, successive recessions, housing affordability issues and an aging population (PEW 2010, 1).

While in the year 2000, 4.8% of U.S. households (5 million households) were multigenerational, by 2008 that number had grown to 5.3% of the nation's total (6.2 million households) and by 2010 6.1% (7.1 million households) (Easley 2011). Similar trends, albeit at a slower pace, exist in Canada. Both nationally and provincially, the percentage of census registered multi-family households has steadily increased (Figure 1). In a 2004 Canadian Census report, it was stressed that 4.9% of households

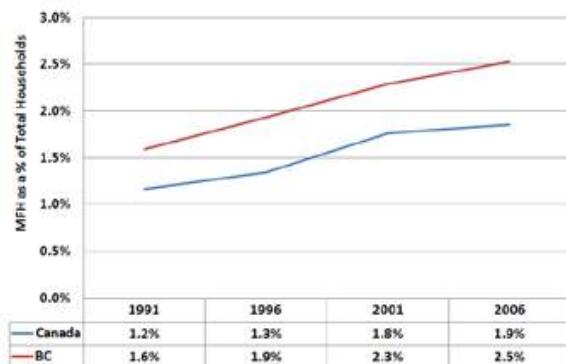


Figure 1- Percentage of MGH/MFH as a share of total households (Statistics Canada 2006)

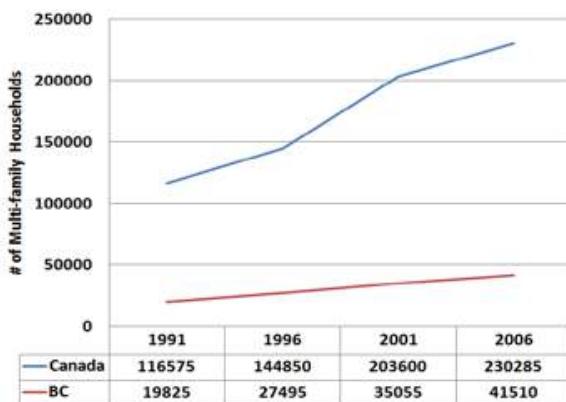


Figure 2- Total number of MGH/MFH households in Canada and BC (Statistics Canada 2006)

in BC had at least three generations living under one roof (the highest in the nation), with the immigrant and aboriginal populations having the highest share of such living arrangement (Statistics Canada 2004). In 2006, about 515,000 grandparents shared a home with their grandchildren, up from about 466,000 in 2001 (Loney 2011). Finally, in Surrey, 7% of households lived in multi-family arrangement, indicating not only a higher share than that of the Province or the nation, but also the highest percentage of MFH in the Metro Vancouver Region, with only 3% of households in MFH (City of Surrey 2010, 21).

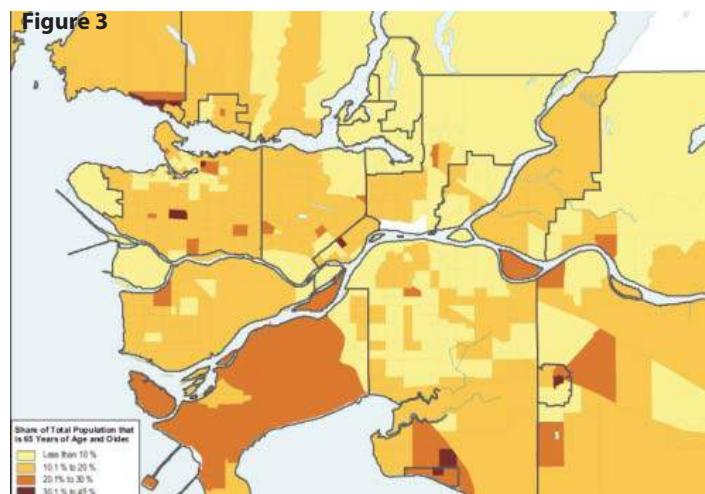
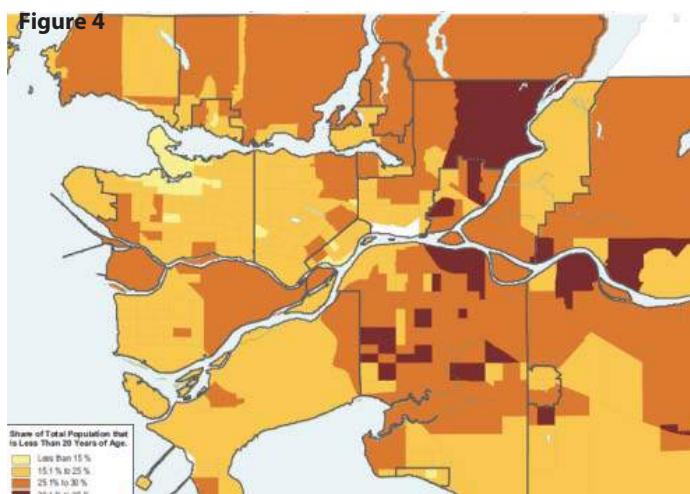
In order to better anticipate change, this report will attempt to unpack demographics and ethno-cultural shifts relevant to the study area of the Surrey Sensitive infill project, with particular emphasis on the neighbourhood and housing design implications of these trends.

### 3. REGIONAL DEMOGRAPHIC TRENDS

The Metro Vancouver region is not immune to the trends discussed above. Between 1996 and 2006, the 45+ age group has experienced the largest increase in population. While in 1996, this age group comprised only 33.5% of the total population of the region, by 2006 their share increased to 40%, with the 55 to 64 age group experiencing a dramatic 36.1% increase during the same time period (Metro Vancouver 2006). This has pushed the 2006 median age to 39.1, a 2.5 year increase in only five years (Metro Vancouver 2006). However, these shifts in demographics are not uniform across the region, given the spatial differences between and within cities (Figure 3 and Figure 4).

Figure 3- % of population above age of 60+ by Metro Vancouver neighborhoods 2006 census

Figure 4- % of population under age of 20 by Metro Vancouver neighborhoods (2006 census)



Changes are also occurring in immigrant settlement patterns, with an increasing share of immigrants and/or visible minorities populating what were once considered suburbs but which are now mature cities in their own right, resulting in increasingly diverse communities across the region (Figure 6). According to the Statistics Canada (2006) almost 75% of immigrants in Vancouver region chose to live in one of the four largest municipalities: City of Vancouver, Surrey, Burnaby or Richmond, while only 57% of Canadian-born residents of the region choose to live in these centers. In the same time period, the City of Surrey had the fastest growth in immigrant population (30.9%), followed by Burnaby (12.5%) and Richmond (12.3%), while City of Vancouver's immigrant population grew by a more modest rate of 5.3% (Statistics Canada 2006).

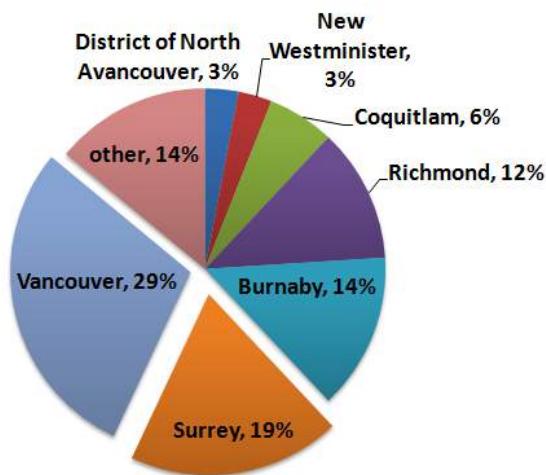
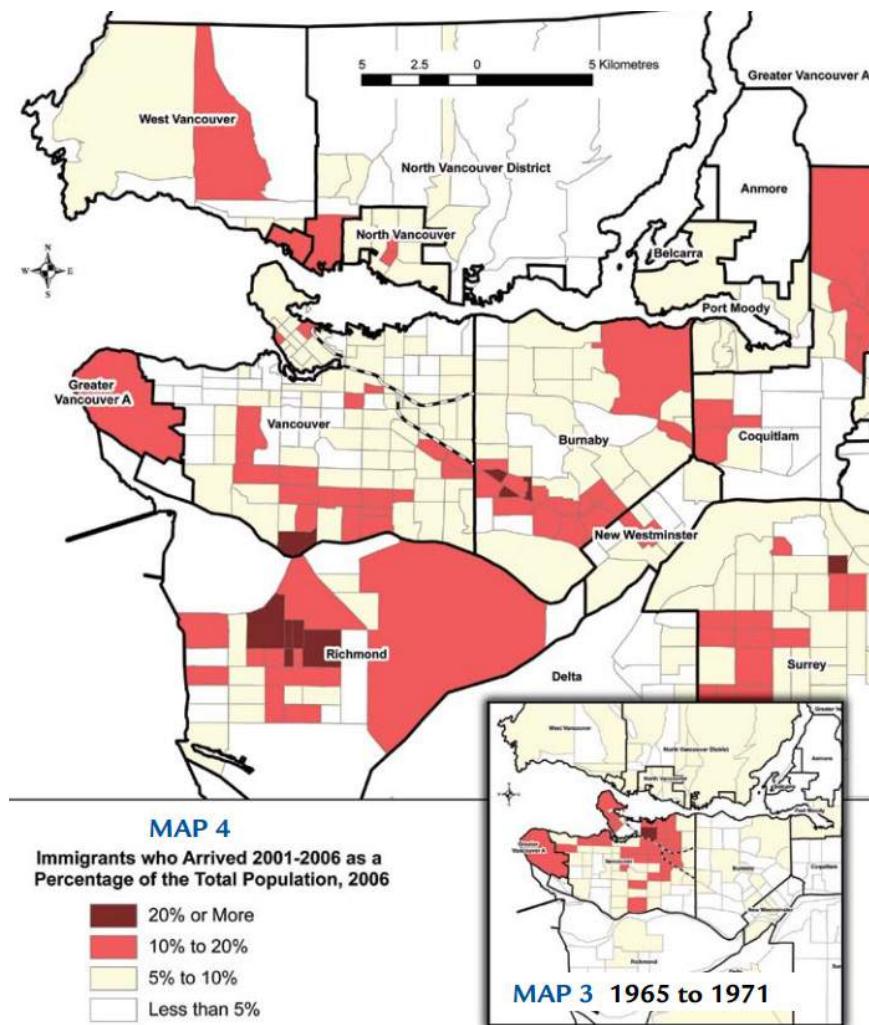


Figure 5- Distribution of recent immigrants (1996 to 2006) by municipality in Metro Vancouver, City of Surrey received the second largest share of immigrants (Metro Vancouver 2006)

Figure 6- Outward movement of immigrants overtime, comparison of the spatial settlement pattern of immigrants between 2001-2006 and 1965 to 1971 (Murdie 2008)



It is predicted that the region will have a population of over 4 million within 50 years, with the baby-boomer bulge creating a persistent reverse pyramid demographic dynamic (Condon and Belaustequigoitia 2006). Figure 7 and Figure 8 show how the acuteness of this bulging cohort changes with and without immigration in the region.

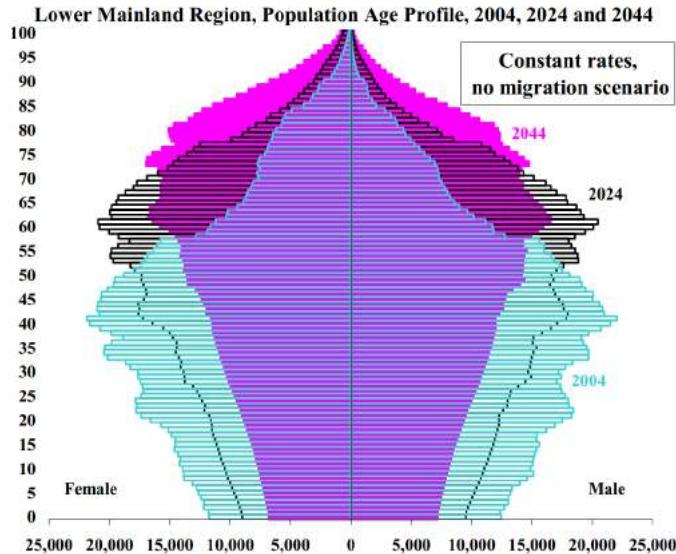


Figure 7 (left)- Lower Mainland Region, population age profile without immigration, revealing a more acute bulge at the top 2004, 2024 And 2044 (Urban Futures 2004)

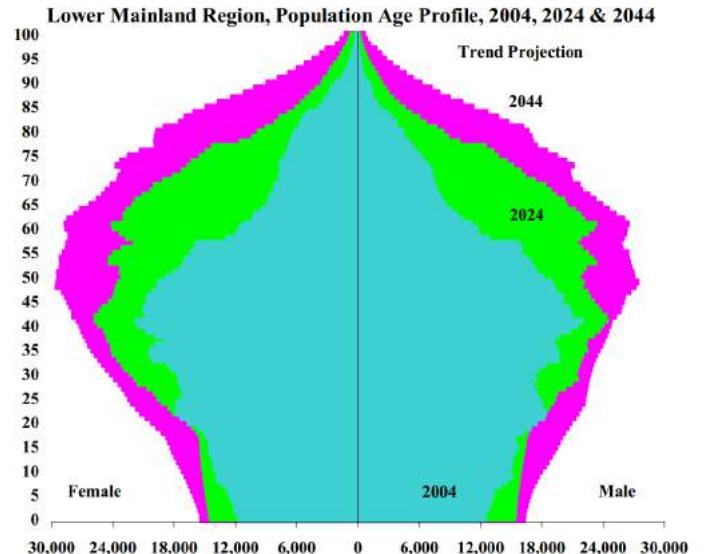


Figure 8 (right) - Lower mainland region, population age profile with immigration, dampening the aging effect of baby boomers 2004, 2024 and 2044 (Urban Futures 2004)

#### 4. ANALYSIS OF TRENDS IN THE STUDY AREA

The cultural and demographic trends discussed thus far are multi-scalar, with implications for the Surrey infill Study down to the parcel scale. In 2006, the median age of city residents was 37, up from 35 in 2000 (younger than the metro’s median age of 39) (Metro Vancouver 2006). Sixty one percent of the population is between 20 to 60 and 11% above 60 years of age. The living arrangement of seniors is most revealing: 67% live in a census family, 11% live with other relatives, 1% live with non-relatives; and 21% (~9,000 seniors) live alone (City of Surrey 2010).



Figure 9- Surrey's share of population by age, 1991 to 2006, revealing both an aging population and rising number of children (City of Surrey 2010)

Surrey's average household size of 3 person per unit is the second largest in the region (Metro Vancouver = 2.6 and Vancouver = 2.2), with Newton and Fleetwood showing the greatest number of people per unit (Figure 10).

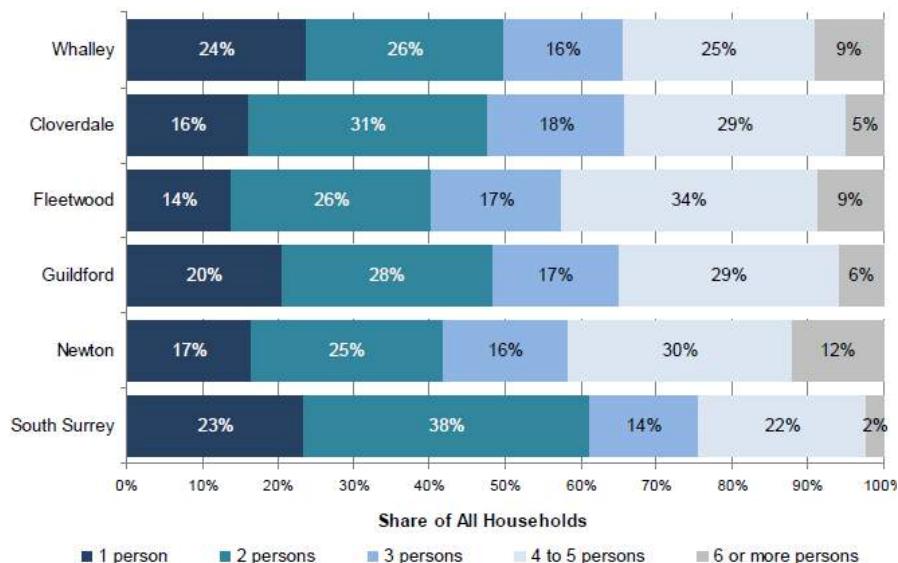


Figure 10- Household size by Surrey community (City of Surrey 2010)

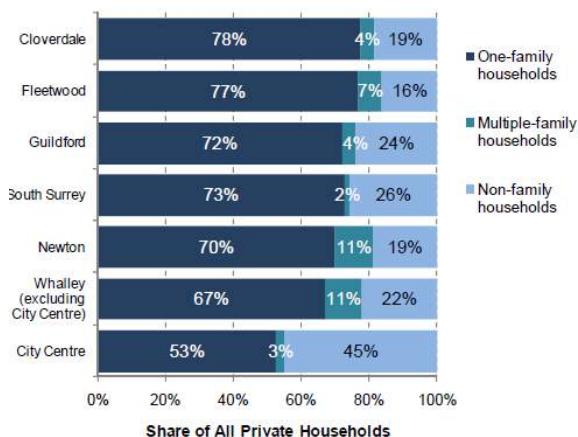


Figure 11- Household composition in Surrey communities (City of Surrey 2010)

Multi-family and multi-generational households are also considerably greater in Surrey than the rest of the region (7% of households compared to 3% in the region), with a considerable share of them residing in the study area. Several complex and interrelated variables such as age, income, ethnicity and economic situation (boomerang generation) have been shown to influence the trends in multi-generational households (PEW 2010). Comparing the family income maps with MFH concentrations (Figure 12), there seems to be noticeable overlap between areas of high concentration of MFH with lower median income areas. Similarly, visible minority areas also exhibit noticeable overlap with areas that have a high concentration of MFH.

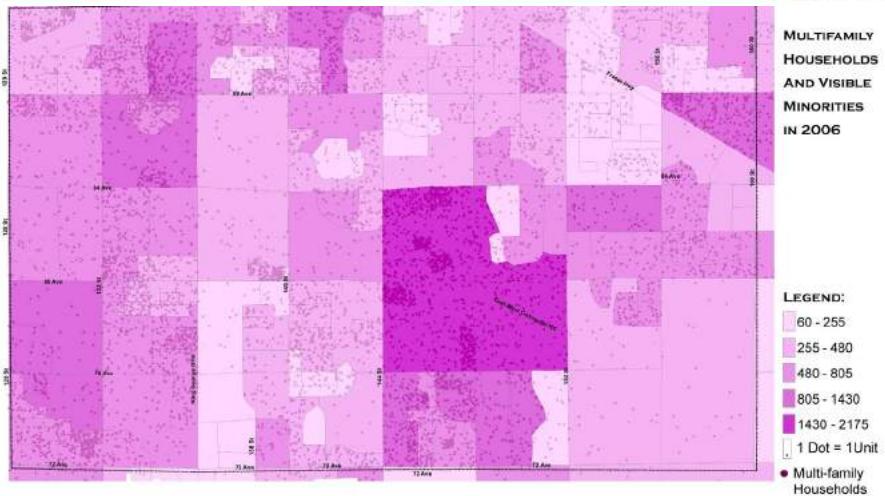
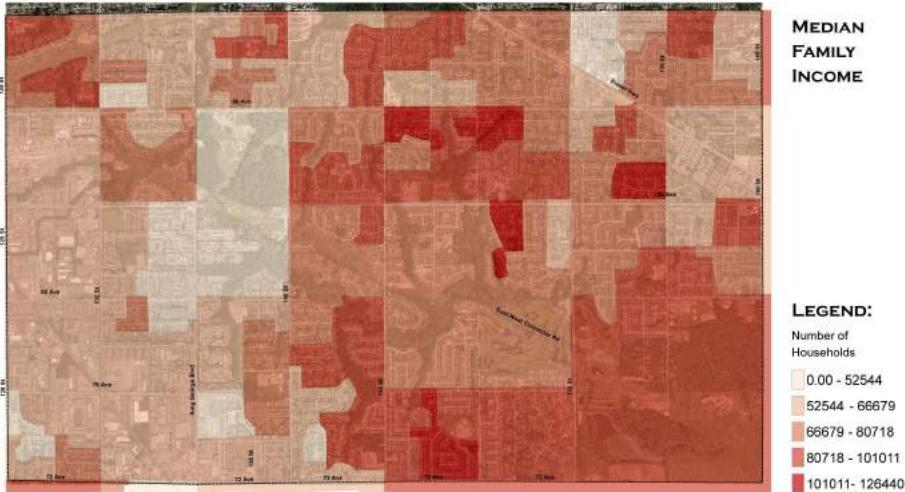
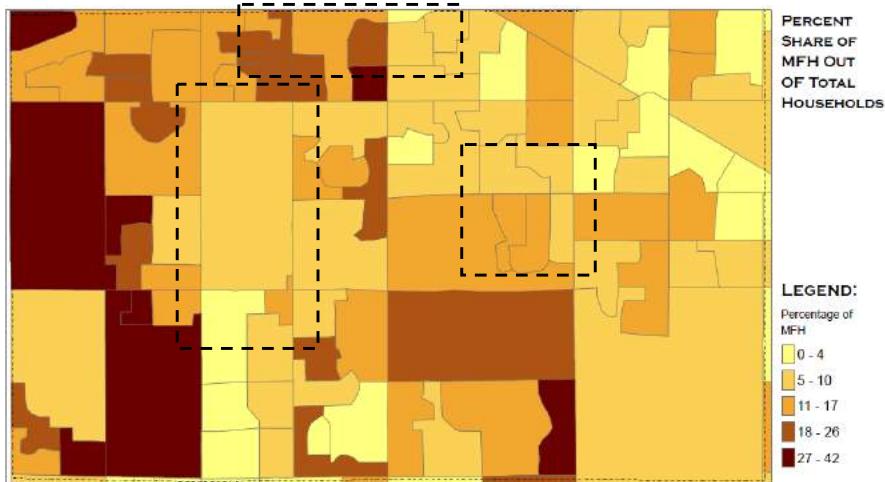


Figure 12 – Comparison between areas with MFH concentration, lower income areas and visible minority settlement patterns

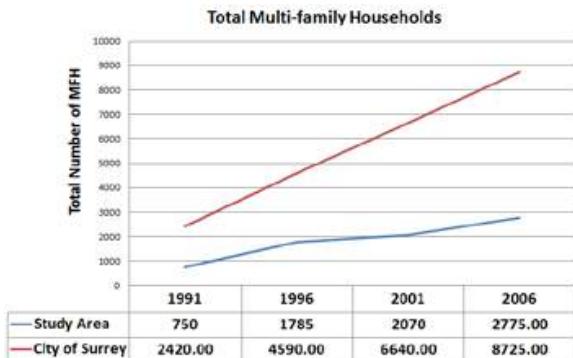


Figure 13- Total number of mfh in the City of Surrey and the study area (statistics Canada 2004)

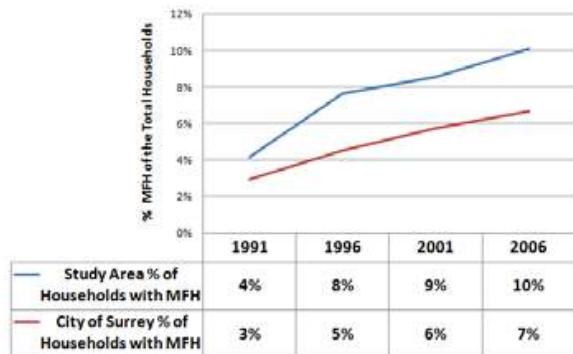


Figure 14- Percentage of households as MFH/MGH (Statistics Canada 2006)

## 5. IMPLICATIONS FOR DESIGN

As stressed earlier, multi-family (or MGH) households are on the rise, both in the city as a whole and in the study area in particular (Figure 15). This is true in both absolute terms and as a percentage of total households. On average, the study area has housed 26% (roughly a quarter) of all the MFH in Surrey. More importantly, the share of this type of households has increased as a percentage of the overall total households in this area, from 4% to 10% (3% higher than the City of Surrey's 7%) (Figure 14).

A simple linear extrapolation of the data using trends established from the census period of 1991 to 2006 is provided in Figure 15. If one assumes continuation of the trends established in the last 20 years, with no major reversal in the structural dynamics of the area, we arrive at about 59,500 total households residing in the study area, with 16% of these households as MFH (9,800 households).

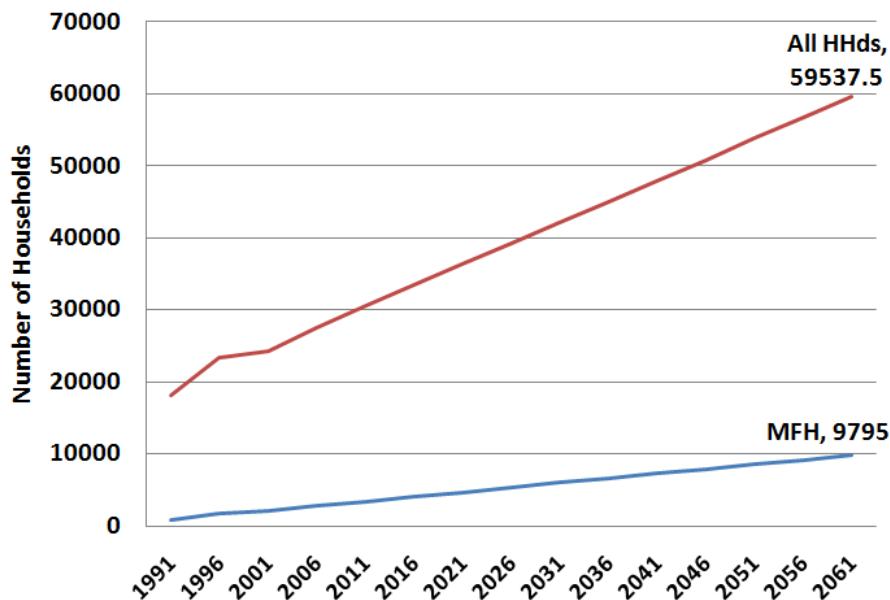


Figure 15- Projected total number of households in the study area (59538) and total number of MFH (9795) – 16% of households will be MFH by 2060.

Therefore, the form of housing required by such living arrangements is becoming an important planning issue. Indeed in response to this growing need across the continent, numerous architectural plans have been created to fulfill the requirements of multi-generational living arrangements. We provide two examples here (multi-generational House Plans 2011).

Some of the key characteristics of appropriate plans for a changing demographics and living arrangements are the following:

- Flexibility of the plans to change over time.
- Provision of adequate living services for multiple households – such as multiple washrooms.
- Ability to partition areas within the structure into different units, with different entrances.
- Gradual conversion of certain rooms in the lot with changing needs of occupants– such as the conversion of the garage or parking lot into secondary suits, as car ownership possibly drops and aging parents desire to move into a smaller living spaces, as they age in place.
- Planned possibility for additions and revisions to the housing structure.
- Greater allowable density per lot.
- Possibility for live-work spaces

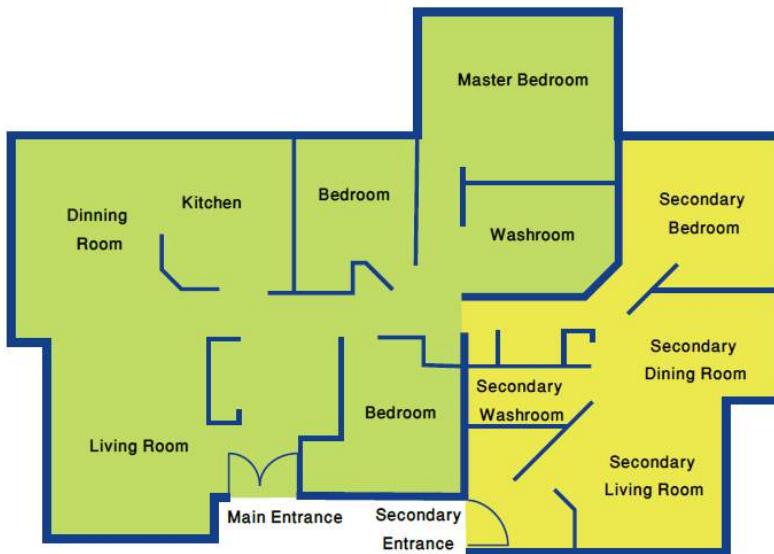


Figure 16- Examples of house plan for a MGH, with two distinct entrances to the premise (Multigenerational House Plans 2011)

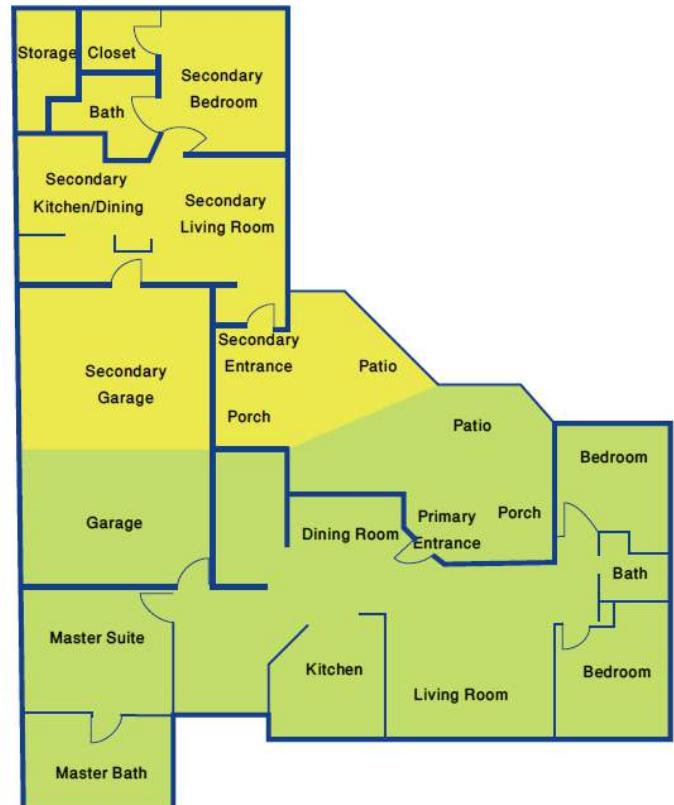


Figure 17- L Shaped MGH plan with possibility for garage space to be converted to living space

## 5.1 CONCLUSION

This paper has outlined major shifts that are shaping the social landscape of modern Surrey. Better understanding of these trends allows for the planning of a more appropriate urban form (including housing types and local services) that also strategically addresses the requirements of sustainability.

An aging population and decreasing family size can open up new opportunities for 'hidden density' and new multi-family living arrangements. As this study area grows by up to 32,000 households (based on current trends), 7,000 new MGH units may be needed. This is a substantial number of units, exceeding the number built in the entire East Clayton Neighbourhood Concept Plan area. Design and policy strategies that would allow these units to evolve organically out of the existing fabric of the district would be useful. Policy options may be various. They may include, the sharing of present single family homes between elderly population, who desire to age in place, with the new, younger and smaller households who might have affordability problems. Therefore, changes to the existing policies - such as allowing for higher build out area (FSR), relaxation of parking requirements as well as legalization of adjustments (and additions) to the existing house plans - can be contemplated in the charrette process as possible tools for tackling these changes. Legalization of secondary suits (already underway), laneway housing and adaptation of single detached dwelling units into multi-family housing might also become prudent strategies to consider.

Finally, it is not simply the footprint of the house that might change, as the services and facilities that are provided by the city in the neighborhoods might need to change as well. For example, while demand in existing schools might decrease, the requirement for elderly community services/health facilities might increase, suggesting temporary or longer term changes to the physical form and community service program of local schools (Condon 2010).

## 6.0 WORKS CITED

BlockTalk. Vancouver Neighbourhood & Community Map. <http://www.blocktalk.ca/vancouver/>.

City of Surrey. Housing Action Plan. Background Information, Surrey: City of Surrey, 2010.

City of Vancouver. "Community Web Pages Downtown." City of Vancouver planning. <http://vancouver.ca/commsvcs/planning/census/2006/localareas/downtown.pdf>.

City of Vancouver. Social Indicators Report. City: City of Vancouver, 2009.

Condon, Patrick M. Seven Rules for Sustainable Communities. Washington D.C.: Island Press, 2010.

Condon, Patrick M., and Jone Belaustequigoitia. Demographics and Housing Projections for a Region of 4 Million. Vancouver: Design Center for Sustainability, 2006.

Easley, Claire. Multigenerational Households Are Here to Stay. April 22, 2011. <http://www.multifamilyexecutive.com/housing-trends/multigenerational-households-are-here-to-stay.aspx>.

Harcourt, Michael, Sean Rossiter, and Kenneth D. Cameron. City Making In Paradise: Nine Decisions That Saved Vancouver. Vancouver/toronto: Douglas & McIntyre, 2007.

Hou, Feng, and Larry S Bourne. "The migration-immigration link in Canada's gateway cities: a comparative study of Toronto, Montreal and Vancouver." *Environment and Planning* 38 (2006): 1505-1525.

Landcor® Data Corporation. "A Decade of Peak Performance: 2000 – 2009 Metro Vancouver Market Overview." Vancouver, 2010.

Ley, David, and P. Murphy. "Immigration in gateway cities: Sydney and Vancouver in comparative perspective." *Progress in Planning*, 2001: 119-194.

Lightbody, James. *City politics, Canada*. Toronto: University of Toronto Press, 2006.

Loney, Sydney. The Multi-Generational Home Makes A Comeback . Jan 20, 2011. <http://www.theglobeandmail.com/life/relationships/family/the-multi-generational-home-makes-a-comeback/article1877264/page1/>.

Mendez, Pablo, Daniel Hiebert, and Elvin Wylly. "Landing at Home: Insights on Immigration and Metropolitan Housing Markets from the Longitudinal Survey of Immigrants to Canada." *Journal of Urban Research*, 15, no. 2 (2006): 82 - 104.

Metro Vancouver. 2006 Census Bulletin #3: Population by Age. 2006. <http://www>.

- metrovancover.org/about/publications/Publications/Census2006\_PopbyAge\_Bulletin\_3.pdf.
- . 2006 Census Bulletin #6: Immigration and Cultural Diversity. 2006. [http://www.metrovancover.org/about/publications/Publications/Census2006\\_Immigration\\_Bulletin\\_6.pdf](http://www.metrovancover.org/about/publications/Publications/Census2006_Immigration_Bulletin_6.pdf).
- Multigenerational House Plans. 2011. <http://www.sidetrackedmoms.com/multi-generational-living/house-plans/>.
- Murdie, Robert A. Diversity and Concentration in Canadian Immigration, Trends in Toronto, Montreal and Vancouver , 1971 - 2006. Research bulletin 42, Toronto: Center for Urban and Community Studies, 2008.
- PEW Research Center. The Return of the Multi-Generational Family Household. PEW Research Center, 2010.
- Ramlo, Andrew, Ryan Berlin, and David Baxter. Canada to 2058: Projections of Demographic Growth & Change for Canada and its Regions. The Urban Futures Institute, 2009.
- Spatial Analysis Branch. Percentage Population Immigrants. GeoBC, 2006.
- Statistics Canada. 930,000 live in three-generation households. 2004. <http://www.statcan.gc.ca/pub/11-002-x/2004/02/04804/4072395-eng.htm>.
- Statistics Canada. Census. 2006.
- . Foreign born as a percentage of population. 2006. <http://www12.statcan.ca/census-recensement/2006/as-sa/97-557/figures/c4-eng.cfm>.
- Talen, Emily. Design For Diversity: Exploring Socially Mixed Neighborhoods. Oxford: Architectural Press, 2008.
- Taylor, Zack, Marcey Burchfield, Byron Moldofsky, and Jo Ashley. Growing Cities: Comparing urban growth patterns and regional growth policies in Calgary, Toronto and Vancouver. Toronto: The Neptis Foundation, 2010.
- UBC Urban Studio 2010. Getting to minus 80. the vancouver streetcar city. 2050 and beyond. 2010. [http://www.urbanstudio.sala.ubc.ca/2010/110203\\_chapter\\_2.pdf](http://www.urbanstudio.sala.ubc.ca/2010/110203_chapter_2.pdf).
- Urban Futures. "The Context for Change: Demographics, Life Cycles, Economics, and the Lower Mainland of British Columbia Over the Next Four Decades." 2004.



## FOUNDATIONAL RESEARCH BULLETIN #2

July 2011

### Speculation on expansion of the district energy system into Surrey's residential fabric through sensitive infill

Professor Patrick M. Condon,  
Sam Mohamad-Khany

#### 1. Goal

This paper will explore a possible land use scenario through which, over the course of five decades, a district energy system (DES) might serve some or all of the Surrey Sensitive Infill site

#### 2. Introduction

District Energy Systems (DES) are simple, efficient and proven technologies, with the basic concept dating as far back as the Roman times (Stantec 2010). DES refers to the set of technologies that allow for the distribution of thermal energy using a central heating (and/or cooling source) and a closed-loop pipe configuration with a carrier fluid, to transfer heat between locations with different heat gradient (Figure 1).

While these systems have long been used across the world, the imperatives of environmental sustainability (with the urgent requirement to reduce GHG emissions) as well as the uncertain future for carbon based fuels, have created a huge growth in interest (Gilmour and Warren 2007). Today, there are approximately 6,000 centralized energy systems in North America with many more being planned and implemented, with a growth rate of 1% a year projected in Canada (Stantec 2010, 19).

The City of Surrey has embraced centralized energy systems as part of its wide ranging sustainability initiatives mandated by its sustainability charter (City of Surrey 2008, 48). Therefore, after extensive pre-feasibility studies for an optimal site with an appropriate technology for the implementation of such a system, a geo-exchange (ground source thermal heat exchange) system for the Surrey City Center is being considered. This system will initially serve approximately 70,000 square meters of floor space, with plans to expand the service area into a million square meter by 2025 (City of Surrey 2011). Expansion of the system

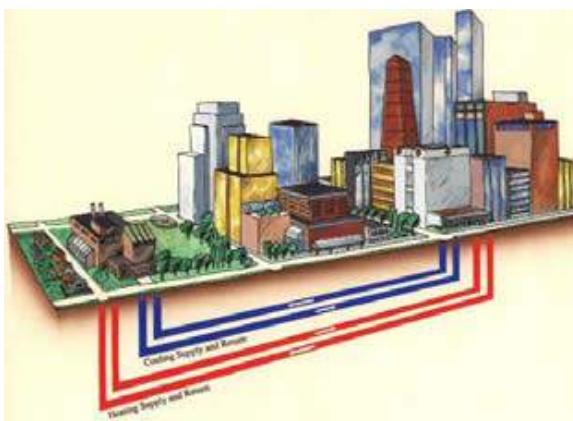


Figure 1- District Energy System Connection to the Neighborhood (International District Energy Association n.d.)

beyond that into the Grandview and Campbell Heights NCP areas are also being considered. (City of Surrey 2011).

This paper will suggest how district energy systems might be further expanded into the Surrey Sensitive Infill's site. While not practical given present demand and energy costs, as fuel prices increase overtime and the land use conditions for the area change this may change.

### 3. Overview of District energy Systems

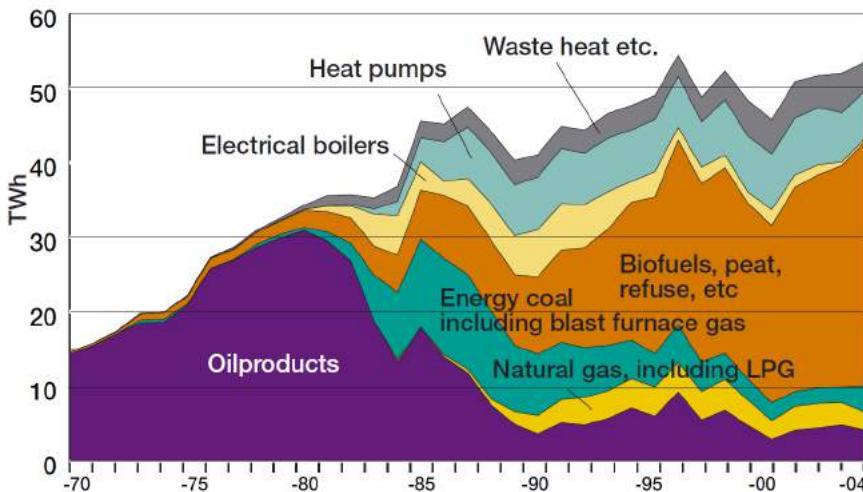
Low temperature heating (below 200 degrees Celsius), which is suitable for much of the heating requirements of housing and commercial buildings, account for 35% of current Canadian fuel energy use (Rogner 1993). In Canada, the majority of such heating comes from electricity (conversion to heat by electric baseboards) and from fossil fuel (boilers and furnaces with forced hot air technology). Use of such high grade fuels not only creates unnecessary emissions but typically produces heat beyond the needs of these buildings and their users.

Hence, unlike current distributed systems that depend on the transfer of energy into heating and cooling at individual destination points, DES allows for centralization of such energy transfers, allowing for economies of scale, reduced operating costs, flexibility in technological changes and fuel selection, improved environmental performance and higher quality of service (Stantec 2010). Flexibility of these systems has allowed Northern European cities to shift their fuel sources over years, without extensive change to their overall infrastructure investment (Figure 3).



Figure 2- Components of DES: 1) Energy Centers 2) Distribution Centers 3) Energy Transfer Stations 4) Building Hydronics (CRM 2009, 3)

Figure 3- Swedish District Energy Fuel Sources (1970 - 2004) (CRM 2009, 5) Source: Swedish Energy Agency.



#### 4. District Energy System Community Design Requirements

**Neighborhood Density (Floor Space Area, Peak Demand, Heat Density)**

**Scale and Rate of Development**

**Land use Mix and Typologies**

**Availability of Low Cost Energy Sources**

While technological requirements of district energy systems are not challenging, economic viability of such systems depend heavily on certain baseline conditions. In terms of community design, contextual factors such as neighborhood density, land use mix, total serviceable area, building types and existing infrastructure have great influence on the feasibility of the system (FVB 2007). Furthermore, future viability of such systems is influenced by technological advancements and fossil fuel prices (Figure 4).

Heating load density, dependent on a combination of the density of buildings (square meter of floor area per hectare) and the intensity of the heating load (kWh/year of heating load per m<sup>2</sup> of floor area), is a core requirement for any centralised system. Minimum energy density of 1,500 MW.h/hectare (150 kWh/ha) is often suggested as a minimum size necessary to merit installation of a district energy system, while on average peak energy densities of around 700 kW/Ha (and floor space intensity of 70 W/m<sup>2</sup>) typically provides a suitable threshold for viability (Stantec 2010, CRM 2008). As a core site for a new DE system is assembled, careful planning is needed to reach the overall requirements set above. Therefore, table 1 can be used to calculate the aggregate heat load density of an area, in order to assess if there exist enough demand for a viable system.

Figure 4- DES Viability Depends on Multiple Complex Factors

Table 1 - Building Blocks of Community Design, need to reach minimum of 1,500 MWh/hectare for each DES plant (CRM 2009, 7)

Energy Intensity Factors	Use	New Row	New Low Rise	New Mid High Rise	New Office	New Retail	Community / Institutional	New Light Industrial
Space [W/m <sup>2</sup> ]	Heat	33	41	41	55	30	55	55
Space [kW.h/m <sup>2</sup> ]	Heat	35	67	67	58	36	58	58
Space [kW.h/m <sup>2</sup> ]	Cool	2	31	33	33	31	57	31
Space [W/m <sup>2</sup> ]	Cool	20	40	40	60	28	56	28

Similar to most sustainability questions, viability of district energy systems depends on multiple, complex and interrelated variables, making it hard to provide a simple formula for their land use requirements. However, through synthesis of numerous case studies in North America<sup>1</sup>, we can sketch out the basic requirements for a practical a system given current energy costs. Furthermore, through simple assumptions about steadily rising fuel prices in future decades, increasing population density, and reasonable assumptions about the decreasing average cost per customer of such systems, we have been able to suggest a one third reduction in minimum requirements per decade.

Table 2 summarizes these findings, serving as a speculative baseline for investigating community design requirement during the Sensitive Urban Infill design charrette. For our purposes, we assume up to a doubling of the population in large parts (or all of) the district, as well as an eventual 300% percent increase in the cost of conventional fuels. As an example, currently in the UK, with 170% greater electricity prices<sup>2</sup> (and generally higher conventional fuel costs<sup>3</sup>), minimum densities of 50 dwelling units per hectare have been shown to be economically serviceable by DES, as compared to minimum 100 DU/ha in Canada (Community Energy Programme n.d., 8). In continental Europe, with much higher fuel costs, even lower residential densities (areas with single detached housing) have been proven to be viable DES candidates (Figure 5). Therefore, with these not unreasonable speculations we can fairly anticipate an increased appetite for district heating systems in the marketplace.

*Footnotes:*

*1 City of North Vancouver, CoV SEFC, Kingsway and Norquay, Whistler, Squamish, East Fraser Lands, Dockside Green and others.*

*2 Average electricity prices are around 20.87 ¢/kw.h (compared to 7.74 ¢/kw.h in Vancouver), with gasoline prices at 184 ¢/liters (compared to 133 ¢/liter in Vancouver)*

*3 European Energy Prices: < <http://www.energy.eu/>>, Canadian Electricity Prices < [http://www.hydro.mb.ca/regulatory\\_affairs/energy\\_rates/electricity/utility\\_rate\\_comp.shtml](http://www.hydro.mb.ca/regulatory_affairs/energy_rates/electricity/utility_rate_comp.shtml)> and Vancouver retail gasoline prices: < [http://www.vancouvergasprices.com/Retail\\_Price\\_Chart.aspx](http://www.vancouvergasprices.com/Retail_Price_Chart.aspx)>*

Figure 5- 103 single detached houses connected to DES in Växjö, Sweden (IEA 2008, 14)



Requirements:	Present Scenario	Post 2060 Scenario
<b>Density<sup>4</sup></b>	>100 DU/hectare	>30 DU/Hectare in the central node or corridors adjacent to the system with lower densities within 800 m radius of the high density buildings.
<b>Neighborhood Massing</b>	3 Gross FSR (core area), 2.5 Gross FSR (adjacent areas)	1.5 GROSS FSR (core area) 1.0 Gross FSR (adjacent areas)
<b>Land Use Mix</b>	80/20 Residential to Commercial	90/10 Residential to commercial
<b>Minimum Total Floor Space</b>	>60,000 sq meter minimum core area	>40,000 sq meter minimum core area
<b>Intensity of Heating Load</b> (kWh/year of heating load per m <sup>2</sup> of floor area)	1,500 MWh/hectare (150 kWh/m <sup>2</sup> )	1,500 MWh/hectare (150 kWh/m <sup>2</sup> )
<b>Core Radius</b>	20 hectare (0.2 square km) core area, with possibility to expand into surrounding 50 hectares (0.5 Sq. Km)	20 hectare higher density nodes (0.25 Sq. Km) extending to adjacent major transit corridors through expansion of pipe network, with 10 to 20 hectare width
<b>Anchor</b>	>5 FSR hydronic ready 'anchor' tenant, such as institutional building or new mixed use, high density development, securing the first 20,000 sq m of floor space (~10,000 sq m lot)	>3FSR hydronic ready mixed-use neighbourhood development, 20,000 sq m of floor space (~100,000 sq m neighbourhood)
<b>Rate of Development</b>	Assume building floor area grows at the same rate as the population growth. Require high rate of development for securing the expansion of customer base (~ 2.5% annually)	
<b>Customer Penetration Rate</b>	~100% Core Area, 50% in Initial Expansion	~100% First core area with 50% penetration around line extensions
<b>BAU Fuel Cost (oil prices)</b>	Current prices (~ 133 ¢/liter, 7.74 ¢/kw.h)	300% increase

Footnote 4:  
A simplistic linear relation established between electricity prices and dwelling densities based on UK and Vancouver averages produces the following equation:

$$\text{Density} = (-3.81) \cdot \text{ElecCost} + 129.47$$

With 300% increase in costs (30.96 ¢/kw.h), density drops to 12 du/ha, an 88% decrease. Given that a linear relationship is too simplistic, a 2/3rd drop is much more realistic as bases of our assumption.

## 5. District Energy System Community Design Implications Study Area

Given the requirements established in Table 2, the current suburban (and low density) land use pattern of the Surrey Sensitive Infill site is not yet conducive to the establishment of new district energy systems. However, two core areas have been identified - due to their density, land use pattern and level of mixing – which may provide a starting point for new DE systems, if significant higher density development occurs within these site (Figure 7).

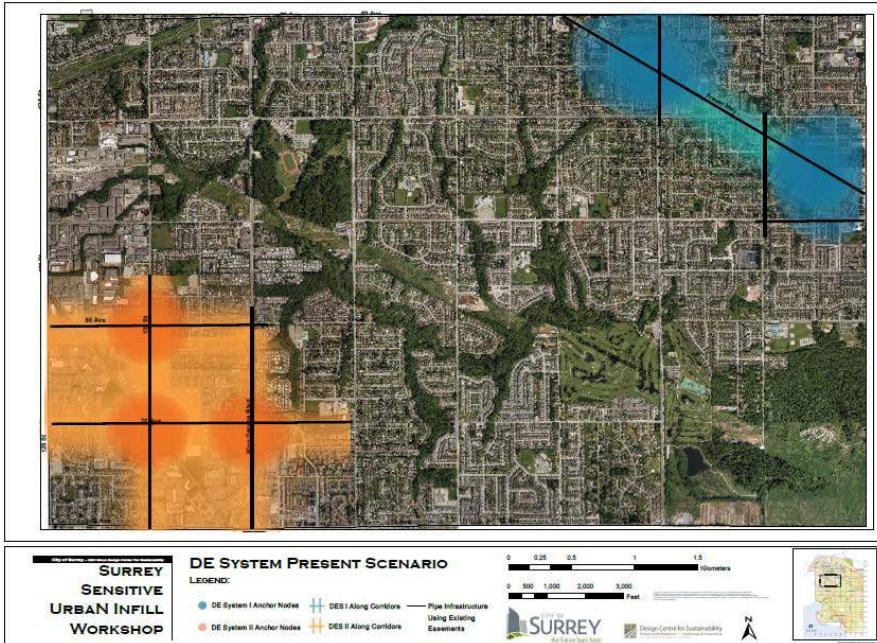


Figure 7- Possible Implementation of DES in the Next Decade in the Study Area

However, careful management and planning of the growth of this area for the next 50 years can allow for the establishment and eventual expansion of the system into the existing fabric, as infrastructure renewals, new developments and higher densities combined with increased fuel prices and a supportive policy base rapidly increases the viability of centralized heating systems. Importantly, It is assumed that the phasing of these new developments, particularly along the nodes located at key transit intersections) allow for addition of new mixed-use developments that support hydronic based heating systems, while providing the necessary anchor heating demand required to allow for further expansion along the corridors (Figure 9). Therefore, one can speculate that through careful and strategic planning of the development in the area, district energy system can

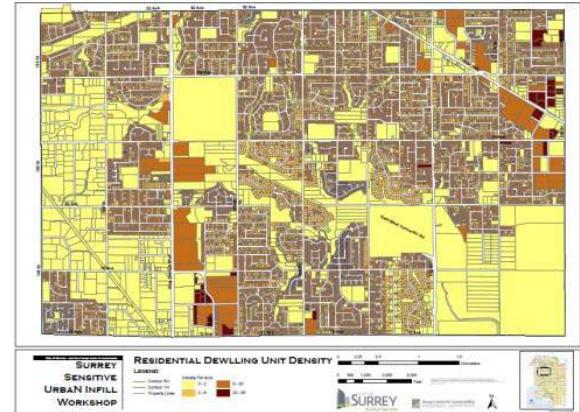


Figure 6- Existing Dwelling Densities

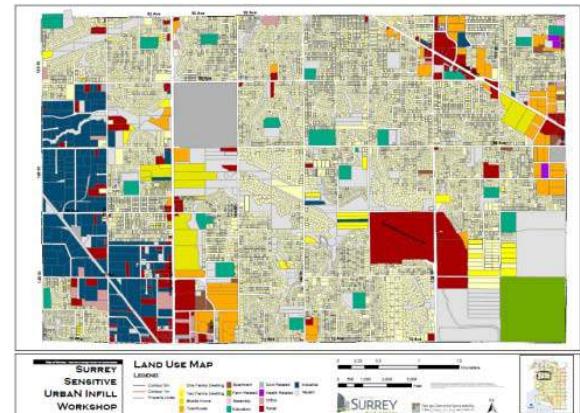


Figure 8- Existing Land Use Pattern

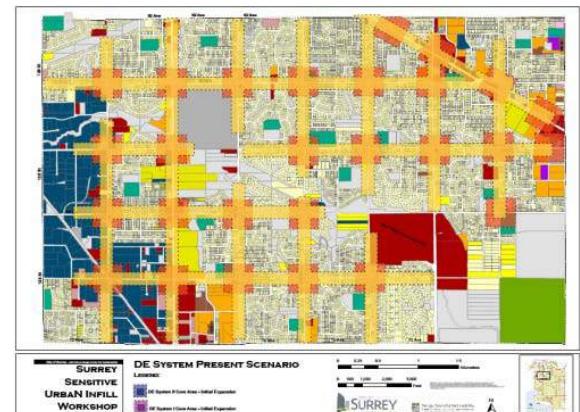


Figure 9- Suggested Densification along Existing Corridors (yellow), with Mixed Use Developments (red) at Major Intersections, Increases the Heating Density Demand in the Area

eventually be woven into the grid fabric of this study site, providing clean and efficient source of energy to the community.

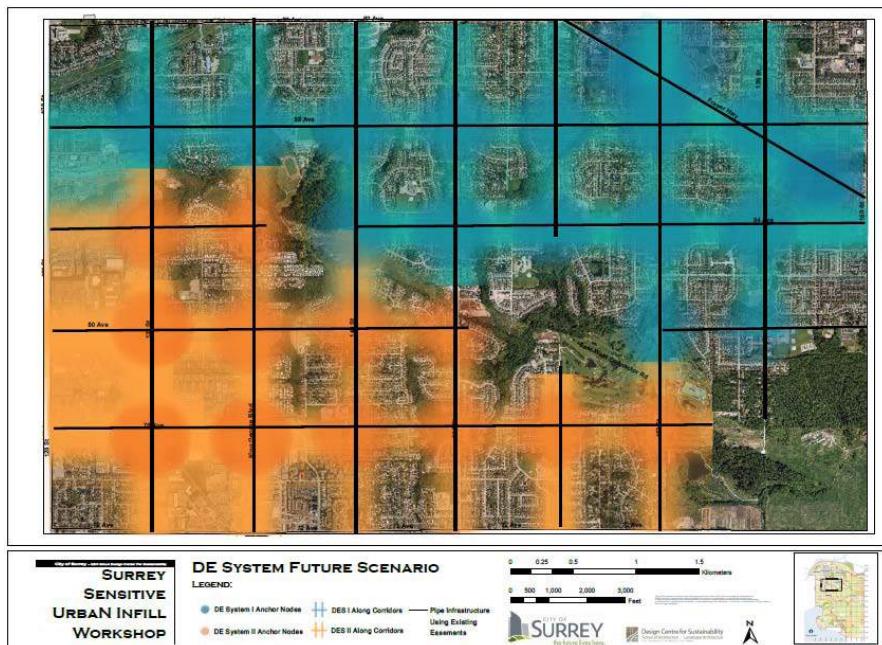


Figure 8- Gradual expansion of the DES into the study area’s fabric, through extension of the services along corridors by utilizing existing pipeline easements, supported by anchor developments on the major transit intersections

## 6. Conclusion

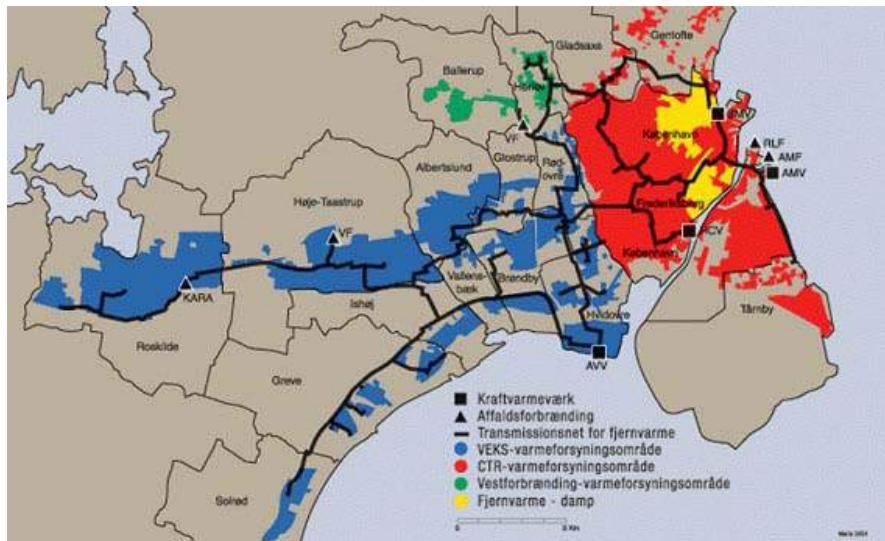
This paper has provided baseline community design requirements to allow policy makers to be intelligent about how area growth might align with minimum requirements necessary for an expanded DES system. It has been shown that a ‘sensitive infill’ scenario, with growth along major corridors and nodes (capitalizing on the existing pipeline and sewer easement infrastructure) might allow for the expansion of DES into a suburban fabric.

The economics of penetrating DES systems deeply into existing single detached family housing fabric may remain challenging for the foreseeable future. Deep in the recesses of the district other strategies may be more appropriate. Encouraging efforts have been made to provide small scale, distributed and centralized system for low-density residential neighborhoods, using renewable sources (Figure 11). As oil prices rise and cost of new technologies drop, there are possibilities for neighborhood scale solar and geothermal (and other forms of) district



Figure 9- Neighborhood scale solar energy system powering 14 residential units, Salmon Street, Oregon (Northwest Neighborhood)

energy systems, which can be established in these inner suburban fabrics. However, as European cases have clearly proven, an existing mature district energy system that is in search of new customers can expand into lower density fabrics as the cost of conventional fuels increase (Figure 12). Therefore, with technological improvements in network delivery, an adequate policy base and an improving economic climate for these systems, annual load densities as low as 10 kWh/m<sup>2</sup> (compared to previous industry minimum of 30 kWh/m<sup>2</sup>) can similarly become viable in North America, making Surrey's inner fabric with detached dwelling neighborhoods viable for such systems.



Therefore, taken together, it is conceivable that the vast majority of the Surrey Sensitive Infill site can one day be covered by one form of renewable centralized heating system (neighborhood scale or district scale) as well as distributed renewable systems, helping Surrey achieve its sustainability goals similar to places such as Copenhagen (Figure 13). For the purposes of this charrette it will not be necessary to arrive at a definitive conclusion about how far DES can penetrate, only to understand the factors that will influence its growth; however far that growth may take it.

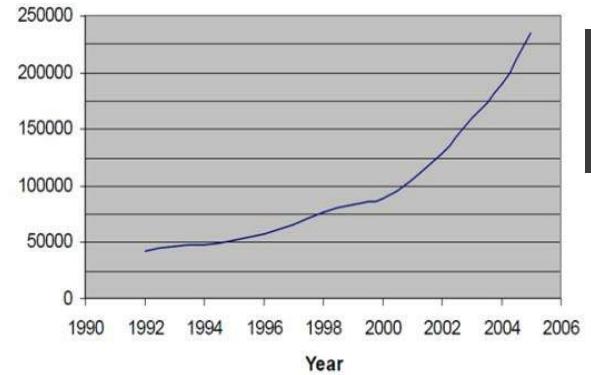


Figure 10- Number of detached housing connected to DES in Sweden, 1990 -2006 (IEA 2008, 98)

Figure 11- A map of Copenhagen outlining the installation of DES along major densified corridors, with connections into the inner neighborhoods (Community Energy Programme n.d., 8)

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## 7.0 Bibliography

City of Surrey. District Energy System – City Centre Area. Corporate Report, Surrey: City of Surrey, 2011.

City of Surrey. Sustainability Charter: a commitment to sustainability. Surrey: City of Surrey, 2008.

Community Energy Programme. Community heating for planners and developers. Carbon and Energy Saving Trust.

CRM. District Energy Consultation Paper: The District of Squamish. Consultant Report, North Vancouver: Compass Resource Management Ltd., 2008.

CRM. District of North Vancouver District Energy Assessment. Consultant Report, North Vancouver: Compass Resource Management Ltd., 2009.

FVB. CITY OF PICKERING: DISTRICT ENERGY PRE-FEASIBILITY ASSESSMENT. Consultant Report, Vaughan: FVB ENERGY INC., 2007.

Gilmour, Brent, and John Warren. Advancing District Energy Development in Canada: A Process for Site Selection, Review and Community Participation. Toronto: Canadian District Energy Association, 2007.

IEA. DISTRICT HEATING DISTRIBUTION IN AREAS WITH LOW HEAT DEMAND DENSITY. International Energy Agency, 2008.

International District Energy Association. <http://www.districtenergy.org/what-is-district-energy>.

Northwest Neighborhood Energy. Neighborhood Natural Energy (N2e). 2008. <http://www.n2e.org/>.

Rogner, Hans-Holger. "Clean Energy Services Without Pain: District Energy Systems." Energy Studies Review 5, no. 2 (1993).

Shiely, Anna, Anne Hampson, and Bruce Hedman. Energy Efficiency and Renewable Energy, COMBINED HEAT AND POWER: Effective Energy Solutions for a Sustainable Future. Oak Ridge: U.S. Department of Energy (DOE), 2008.

Stantec. DISTRICT ENERGY SYSTEM PRE-FEASIBILITY STUDY CITY OF WHITEHORSE, YUKON. Consultant report, Vancouver: Stantec Consulting Ltd. and Earthvoice Strategies, 2010.

