



Surrey's GIS Projection Model: How to Estimate Development Unit and Population Figures

The Building Inventory – Methodology

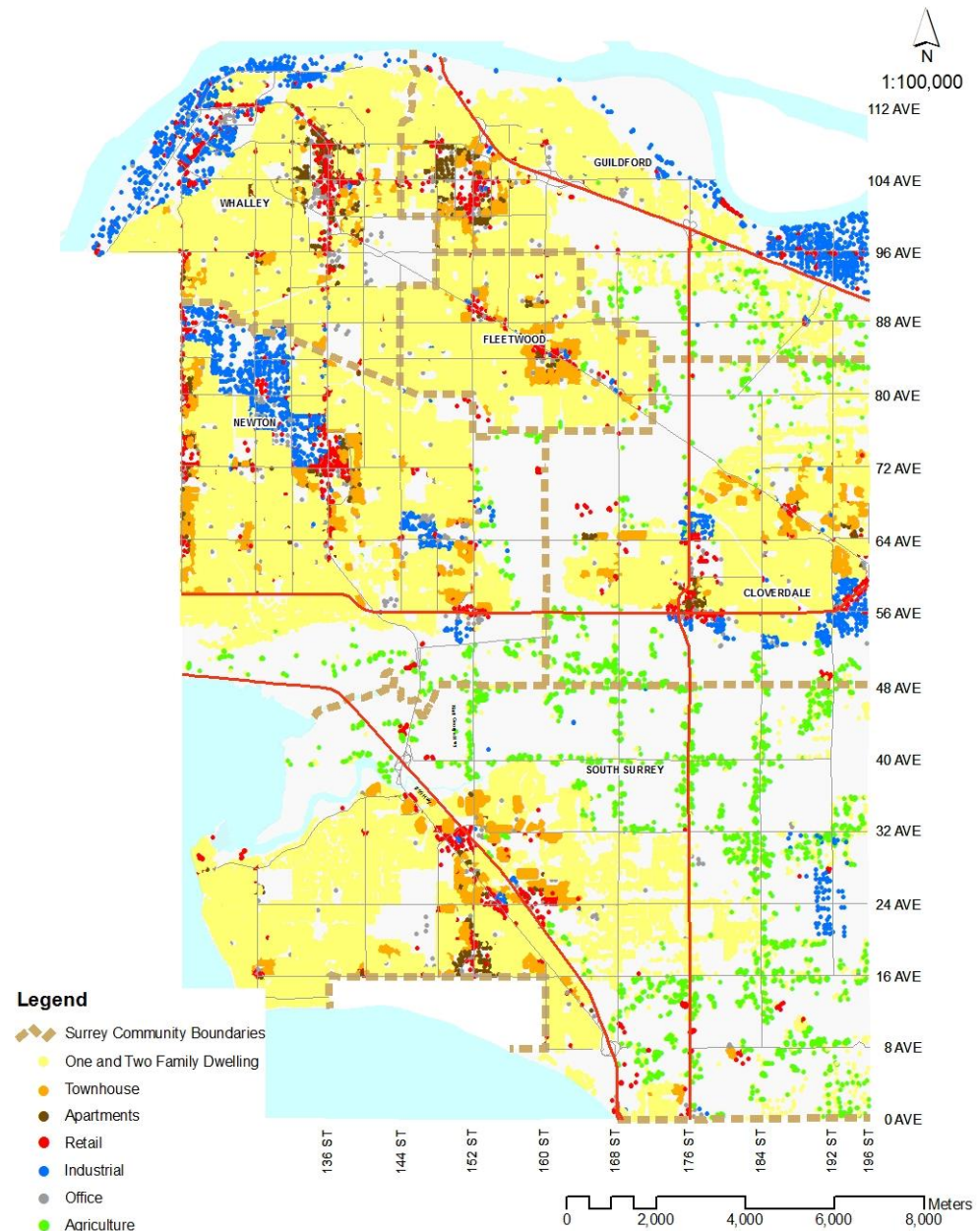
- The Surrey Population Model contains two major data components:
 - The GIS data component which is an inventory of all buildings in the city; and
 - The non-GIS component that includes existing and projected (2041) unit, population and employment figures.

The Building Inventory – Methodology

- The GIS building inventory was created using a combination of data sources that include:
 - BC Assessment Authority Data
 - Surrey Building Permit Information (Amanda)
 - City of Surrey Secondary Suite By-Law Enforcement Data
 - The latest GIS Orthophoto Imagery
 - City of Surrey GIS Cadastre (lot and address) Information
 - Statistics Canada Census (matching undercount and average household size).

Surrey's Building Inventory

As of December 2012, there are 169,600 residential units with a total 367.9 million sqft in Surrey. The average units size is 2,169 sqft. There is also 106.37 million sqft of nonresidential building space in Surrey.



Attribute Information

Column Heading	Attribute Information
FOLDER NO	Amanda Folder Number
ADDRESS	Property Address
DEVELOPMENT TYPE	Nonresidential Residential
DEVELOPMENT SUBTYPE	Assembly Coach House Education Farm Related Govt Related Health Related High Rise Apartment Industrial Low Rise Apartment Mobile House Office One Family Dwelling Recreational Club House Retail Secondary Suite Townhouse Two Family Dwelling

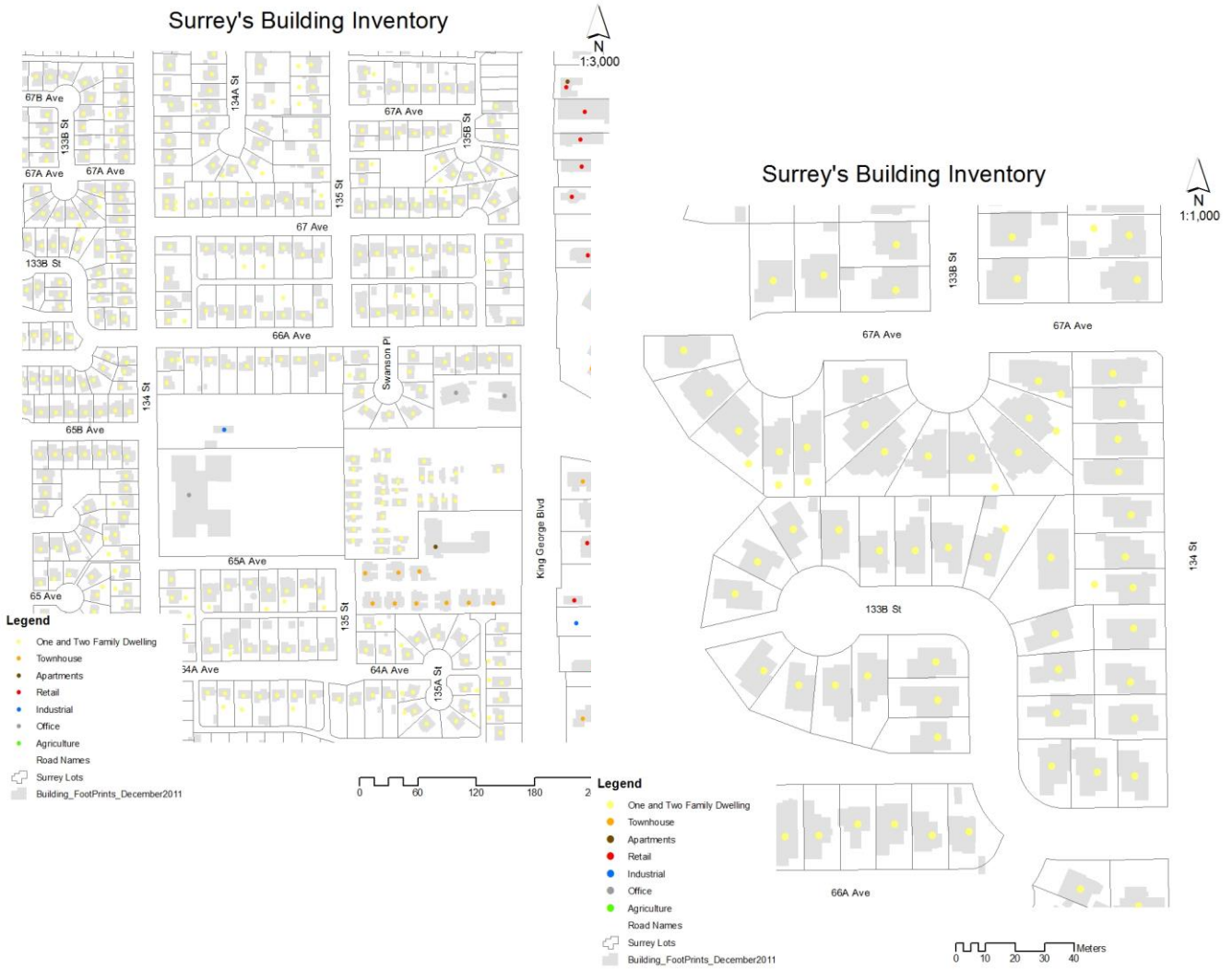
Column Heading	Attribute Information
NONRESIDENTIAL SUBTYPE	Assembly Automotive Services Automotive Storage Education Farm Related Fire Station Govt Related Gravel Storage Health Related Hotel Library Lumber Yard Manufacturing Office Outdoor Metal Storage Post Office Rail Yard Recreation Related Recreational Club House Retail Shopping centre Transit parking Truck Storage Utilities Warehouse
RENTAL TYPE	Market Rental Mixed Non-Market Rental Not Rented

Column Heading	Attribute Information
SPECIAL HOUSING TYPE	Aboriginals Co-op Emergency Shelter Family Mental Health Addictions Multi Types Seniors Special Needs Transition-Supportive Not Applicable
SECONDARY SUITE TYPE	Authorized None Unauthorized
SECONDARY SUITE FEE	Yes No
PRE_2000	Yes No
CONSTRUCTION YEAR	Year of Building Construction
BUILDING PERMIT ISSUE MONTH	Month Not Applicable
FLOOR AREA	Building Floor Area
CONSTRUCTION VALUE	Construction Value of Building
DWELLINGS	Number of Residential Dwellings
AVERAGE HOUSEHOLD SIZE	Average Household Size by Community
POPULATION	Population Within Each Building
EMPLOYMENT	Employment Within Each Building

There are 18 variables that contain information for each building in Surrey.

Surrey's Building Inventory

- A typical single family neighbourhood containing a school and surrounded by multifamily.
- The map also contains Surrey's building footprints.
- The second map (*bottom*) illustrates a closer look at a single family neighbourhood. secondary suites are digitized within the lot but outside the building foot print.



Surrey's Building Inventory

- The building inventory contains secondary suite information.
- Although not complete, Planning and Development has compiled a list of over 20,000 address that come from the Surrey Bylaw Department.
- This data is included in the unit and population totals.
- They are kept as separate point features within the model which distinguishes them from the main single family unit.

Surrey's Building Inventory

- The building inventory also contains multifamily units (townhouses and apartments)(*top*).
- Only one point feature per building is used to identify multifamily.
- Each multifamily point feature may identify many units per building.



- Surrey engineering purchases orthophotos on an annual basis (*bottom*).
- Orthophotos are also used to verify and correct the building inventory.
- It also ensures that the point feature are placed correctly in the centroid of the building footprint.





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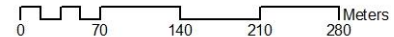
Surrey's Building Inventory

- Surrey's building inventory also contains a non-residential component.
- The data does not contain business information. As with residential, a single point feature will only identify the building along with floor space and estimated total employment.
- Floor space and average worker density ratios are used to estimate employment. This is joined to business license information to verify employment.



Legend

- One and Two Family Dwelling
- Townhouse
- Apartments
- Retail
- Industrial
- Office
- Agriculture
- ⊕ Road Names
- ⊕ Surrey Lots
- Building_FootPrints_December2011



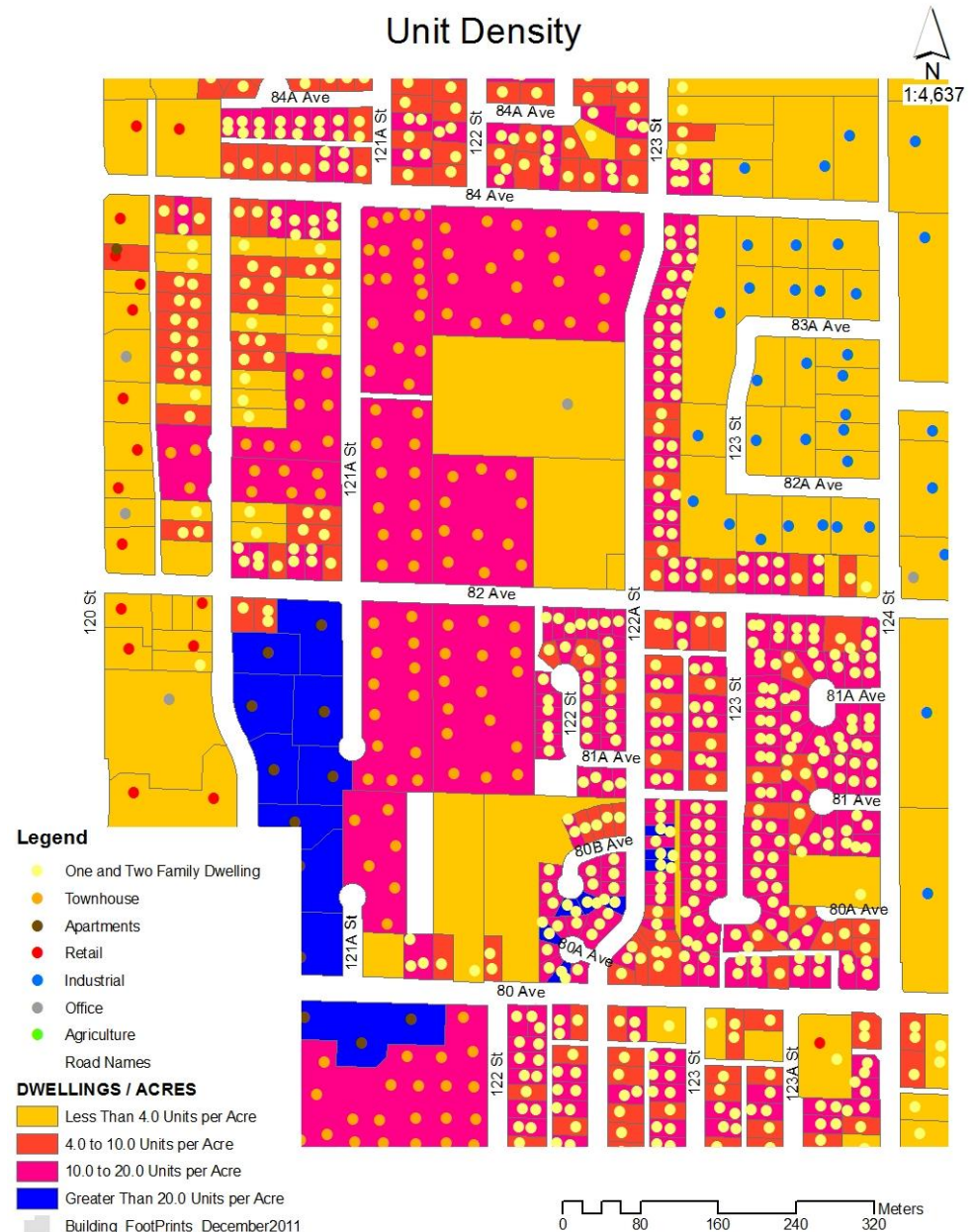
Surrey's Business Directory

- The Economic Development Office collects and analyzes information to make investment decisions, encourage business growth and creates municipal economic policy.
- There is the potential to Geocode this information into the building inventory via address.
- The issue is that the business license data does not contain government and other institutions who do not require a business license.

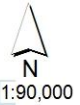
Business Name	Products or Services	Unit	House	Road	Postal	Phone	Employees	Town	Business Type	Licence Issue Date
3 98231	Order by Mail		37	7088 191 St	V4N0B4	6045763966		1 CTC	Home Occupation	6-14-11 0:00
4 Surjit Mehanger	Trucking & Cartage			6226 128A St	V3X3L9	6045521605		1 NTC	Home Occupation	12-05-11 0:00
5 # 2 Happy Hair Cut Beauty Salon	Hair Salon/Barber	100B		13753 72 Ave	V3W2P2	6045977666		1 NTC	Commercial/Indust	5-10-11 0:00
6 #1 Happy Hair	Hairdressing		7	7548 120 St	V3W3N1	6045434057		2 NTC	Commercial/Indust	9-26-11 0:00
7 #1 Impex Canada Ltd	Wholesaler		101	12815 85 Ave	V3W0K8	6045946862		1 NTC	Commercial/Indust	3-29-11 0:00
8 #1 Nails	Esthetician		104	18408 64 Ave	V3S1E9	6045758037		5 CTC	Commercial/Indust	9-12-11 0:00
9 #1 Sub Garden Ltd	Restaurant - Deli Take Out			13482 72 Ave	V3W2N8	6045729311		2 NTC	Commercial/Indust	5-10-11 0:00
10 #2 Bear Creek Coin Laundry & Tanning	Laundromat,Tanning Salon		B113	13578 88 Ave	V3W3K8	6045988779		1 NTC	Commercial/Indust	5-10-11 0:00
11 #4 Happy Haircut & Beauty Parlour Ltd	Hairdressing		104	15955 Fraser Hwy	V4M0Y3	6045121749		1 FTC	Commercial/Indust	11-02-11 0:00
12 [Crossfit Renegade] Renegade Athletics	Recreational Facility		6	6468 King George	V3W4Z3	6045847457		1 NTC	Commercial/Indust	11-17-11 0:00
13 1049218 BC Ltd	Manufacturer - Cabinets			6238 138 St	V3X1E6	6045304323		1 NTC	Home Occupation	11-25-11 0:00
14 0431338 B C Ltd	General Cont.			18869 54A Ave	V3S6R4	6049286255		1 CTC	Home Occupation	5-12-11 0:00
15 0492549 BC Ltd	Equipment Leasing	201		3237 King George	V4P1B7	6049530909		1 S5TC	Commercial/Indust	5-19-11 0:00
16 066786 B C Ltd	Contractor - General			6855 128 St	V3W4E1	6043775909		1 NTC	Home Occupation	10-27-11 0:00
17 0685634 B C Ltd	Construction			2910 Woodcrest P	V4P2K8	6042403400		1 S5TC	Home Occupation	2-03-11 0:00
18 0733173 BC Ltd	General Cont.			15098 68A Ave	V3S3S4	6047822575		1 NTC	Home Occupation	3-02-11 0:00
19 0736941 BC Ltd	Contractor - Miscellaneous			4952 144 St	V3W5R9	6047652271		1 NTC	Home Occupation	9-21-11 0:00
20 0748093 BC Ltd	General Construction Cont.			12732 56 Ave	V3X2V6	6048392920		1 NTC	Home Occupation	11-18-11 0:00
21 0751298 BC Ltd	Contractor - General			12377 82 Ave	V3W3E5	6045978581		1 NTC	Home Occupation	10-26-11 0:00
22 0751637 BC Ltd	Property Management			13482 Vine Maple	V4P1W9	6047863099		1 S5TC	Home Occupation	9-26-11 0:00
23 0752528 BC Ltd	Contractor - Construction			6160 149A St	V3S7K3	6047244080		1 NTC	Home Occupation	1-04-12 0:00
24 0763301 BC Ltd	Consultant			1892 141A St	V4A7S8	6043238886		1 S5TC	Home Occupation	8-18-11 0:00
25 0772832 BC Ltd	Mfg. & Installation - Signs	14		8456 129A St	V3W1A2	6049618414		1 NTC	Commercial/Indust	1-23-12 0:00
26 0786467 BC Ltd	General Cont.			14980 72 Ave	V3S2E1	6045905680		1 NTC	Home Occupation	6-14-11 0:00
27 0793982 BC Ltd	Financial Planning/Consultant	218		7928 128 St	V3W4E8	6047210065		1 NTC	Commercial/Indust	8-03-11 0:00
28 0801669 BC Ltd	Contractor - General			15123 68 Ave	V3S2B8	7788655130		1 NTC	Home Occupation	11-21-11 0:00
29 0802196 BC Ltd	Financial Planning/Consultant	209		7928 128 St	V3W4E8	6045982955		2 NTC	Commercial/Indust	6-15-11 0:00
30 0807713 BC Ltd	General Cont.			6827 123A St	V3W0X4	6046174648		1 NTC	Home Occupation	6-20-11 0:00

Density

- Attribute data from Surrey's building inventory can also be Geocoded to the cadastre or lot based data either by address or spatial join.
- Unit, population and employment total and/or density can be calculated starting at the lot level.
- This method can also be used for other geographies with Surrey.

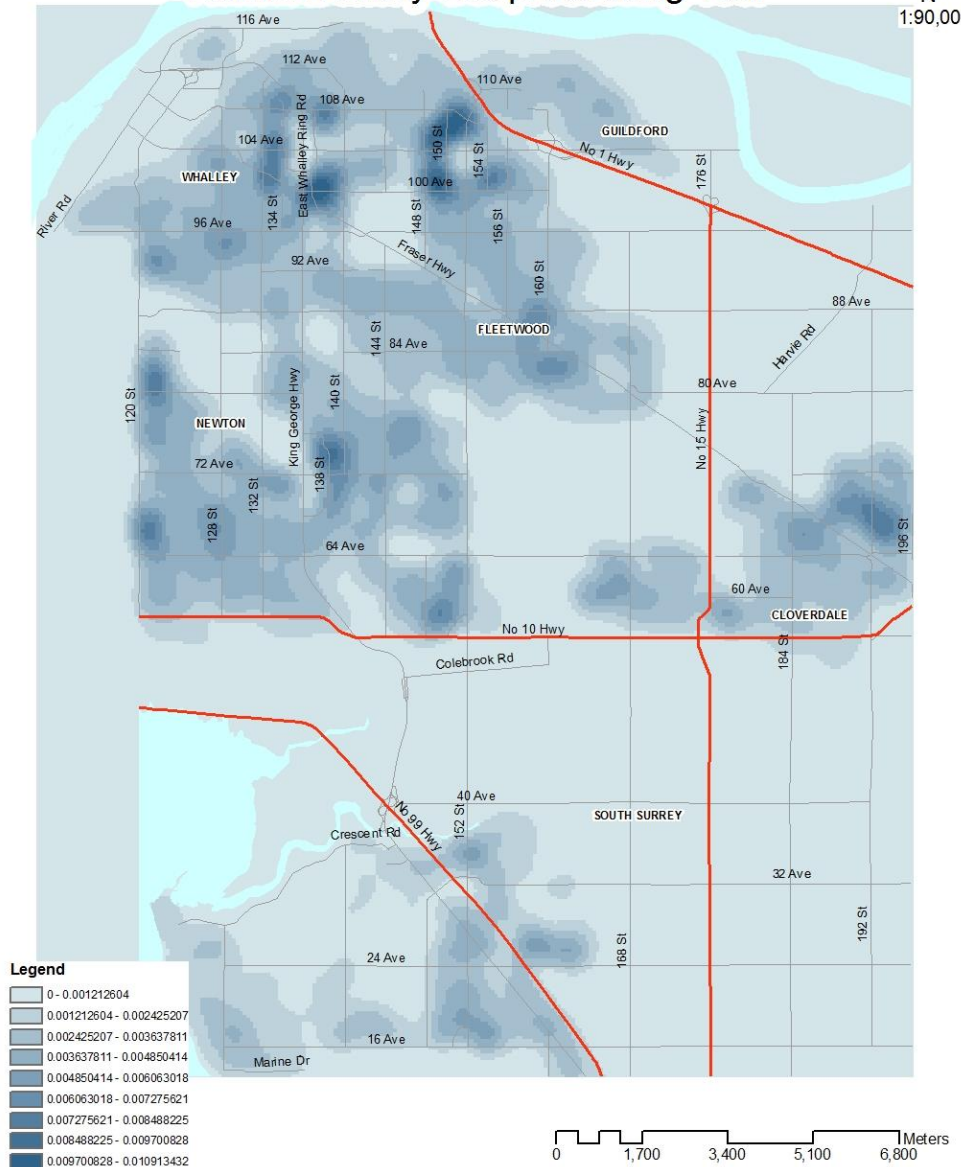


Population Density Using the Kernel Density Geoprocessing Tool

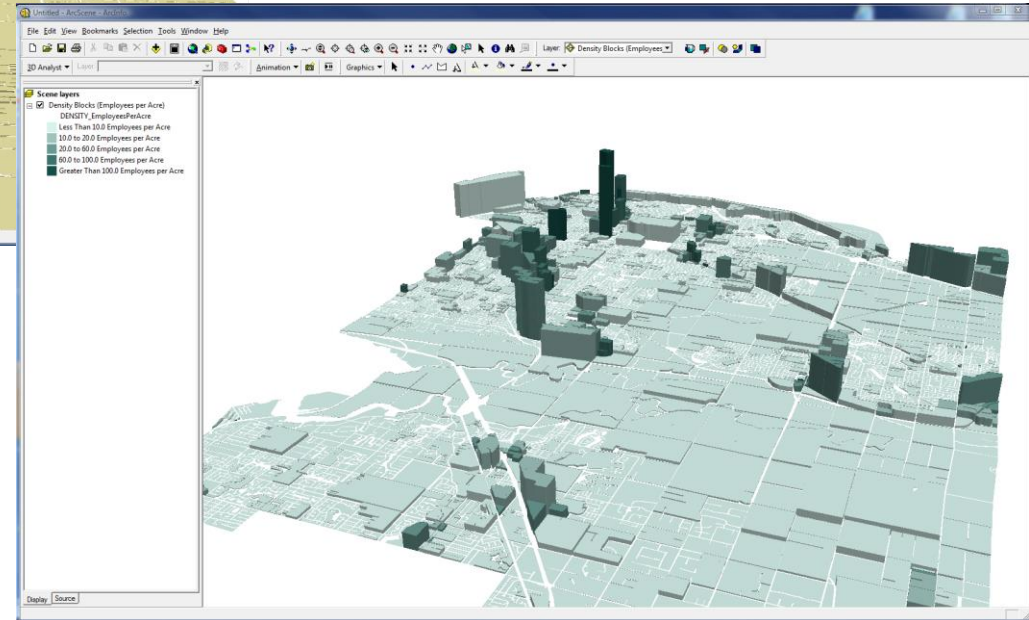
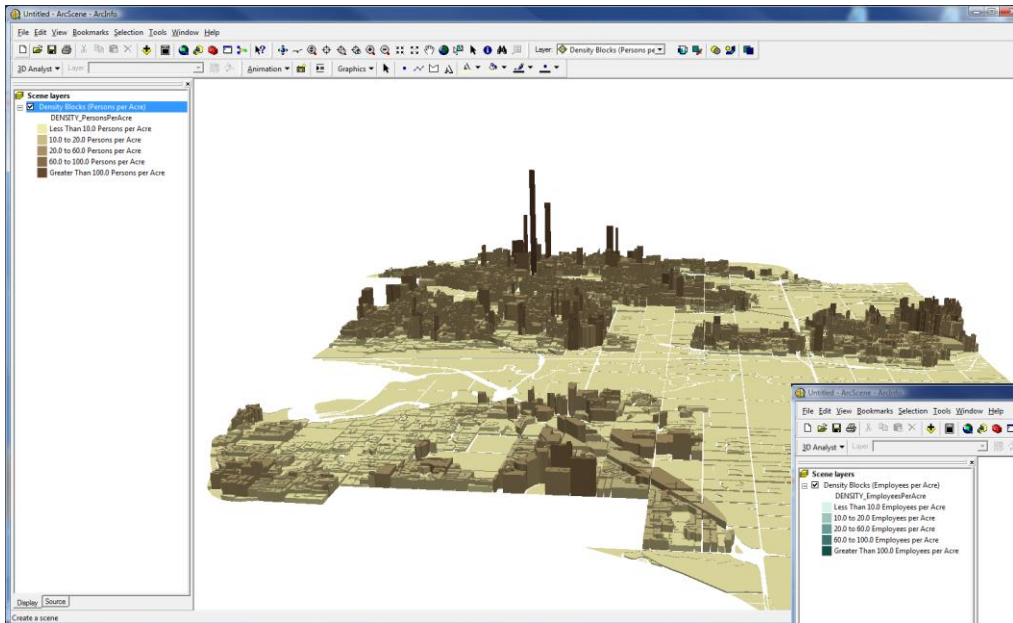


Density

- The building inventory can also be used to create raster files that represent density or any other attribute that is contained in the building inventory.
- The Kernel Density tool calculates a magnitude per unit area from point features using a kernel function to fit a smoothly tapered surface to each point.



3D Model of Density



- Persons per acre at the block level in Surrey (*top*).
- Employees per acre at the block level in Surrey (*Bottom*).

Surrey's Building Demolitions

- In 2012, there were 37 single family demolitions in Cloverdale, 28 in Fleetwood, 20 in Guildford, 112 in Newton, 120 in South Surrey and 139 in Whalley.
- Since 2000, residential and nonresidential demolition permit information factors in building demolitions.
- Using Surrey's latest orthophotos, demolished units are removed from the building inventory.
- This information is used to create a net increase for monthly and annual unit and population figures.



Attribute Information

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RENTAL TYPE	Market Rental Mixed Non-Market Rental Not Rented

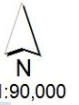
Column Heading	Attribute Information
SPECIAL HOUSING TYPE	Aboriginals Co-op Emergency Shelter Family Mental Health Addictions Multi Types Seniors Special Needs Transition-Supportive Not Applicable
SECONDARY SUITE TYPE	Authorized None Unauthorized
SECONDARY SUITE FEE	Yes No
PRE_2000	Yes No
DEMOLITION YEAR	Year of Building Construction
DEMOLITION_PERMIT ISSUE MONTH	Month Not Applicable
DWELLINGS_LOST	Number of Residential Dwellings
AVERAGE HOUSEHOLD SIZE	Average Household Size by Community
POPULATION_LOST	Population Within Each Building
EMPLOYMENT_LOST	Employment Within Each Building

There are 16 variables that contain information for each building in Surrey.

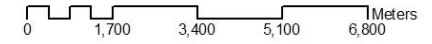
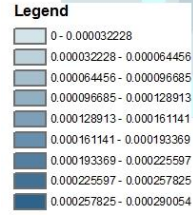
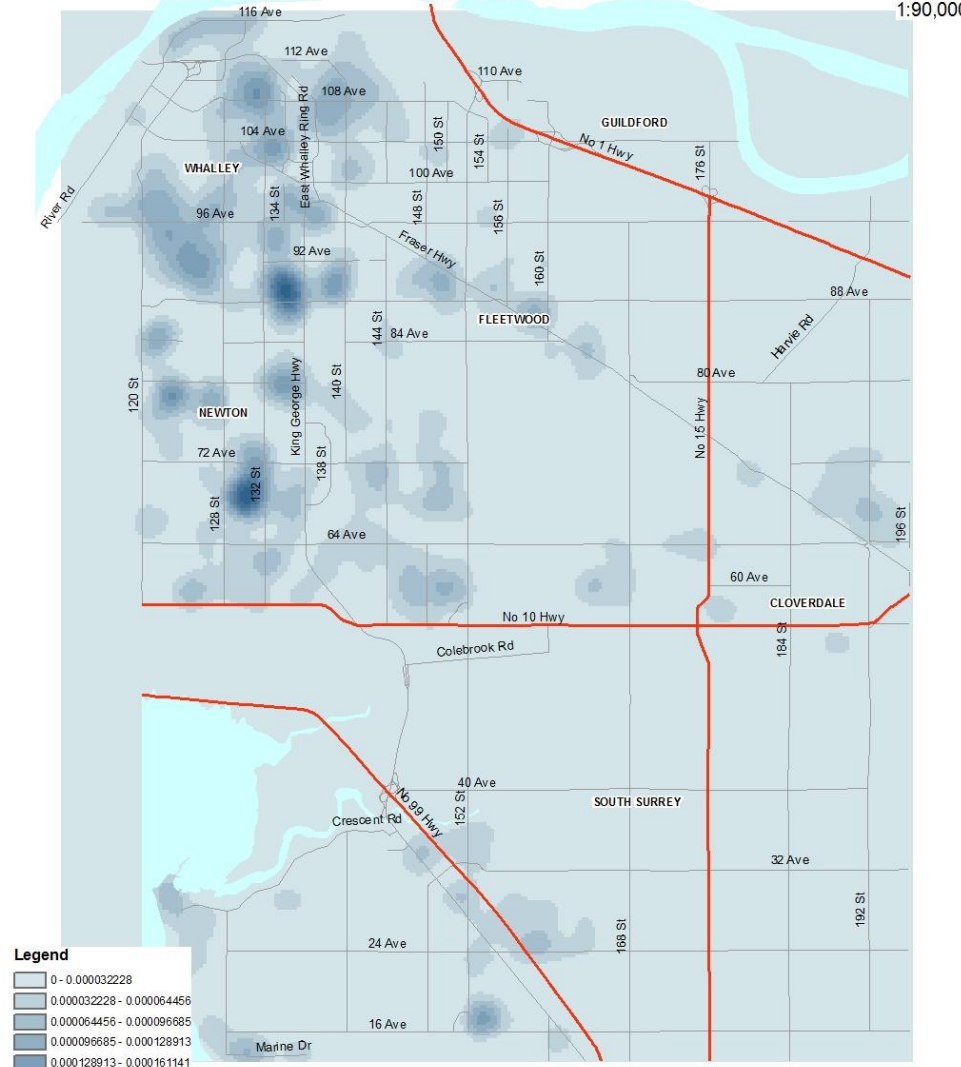
Surrey's Building Demolitions

The inventory of demolitions can also be used to create raster files that represent density or any other attribute that is contained in the demolition inventory.

Density of Residential Demolitions Using the Kernel Density Geoprocessing Tool



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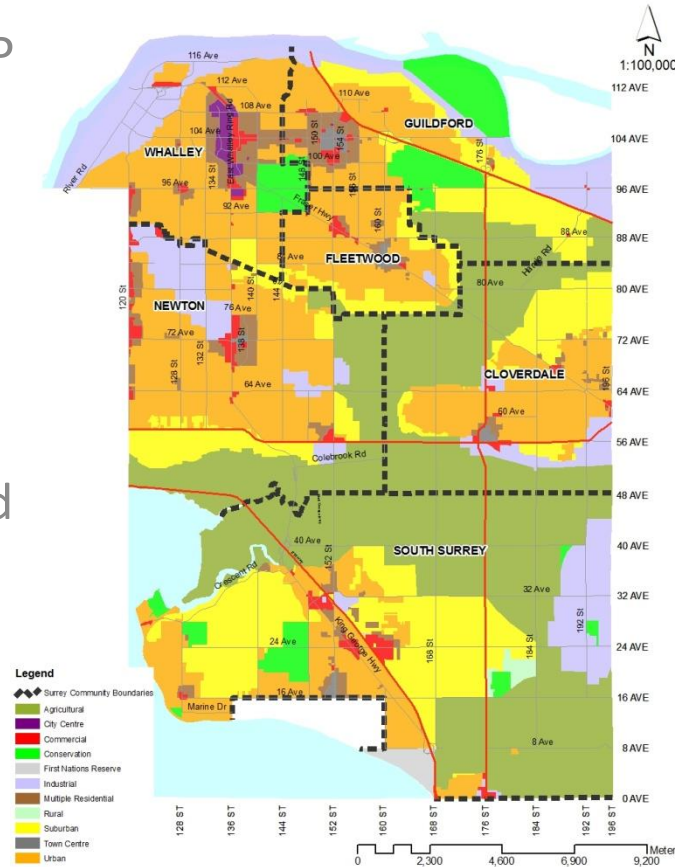


Surrey's Building Inventory

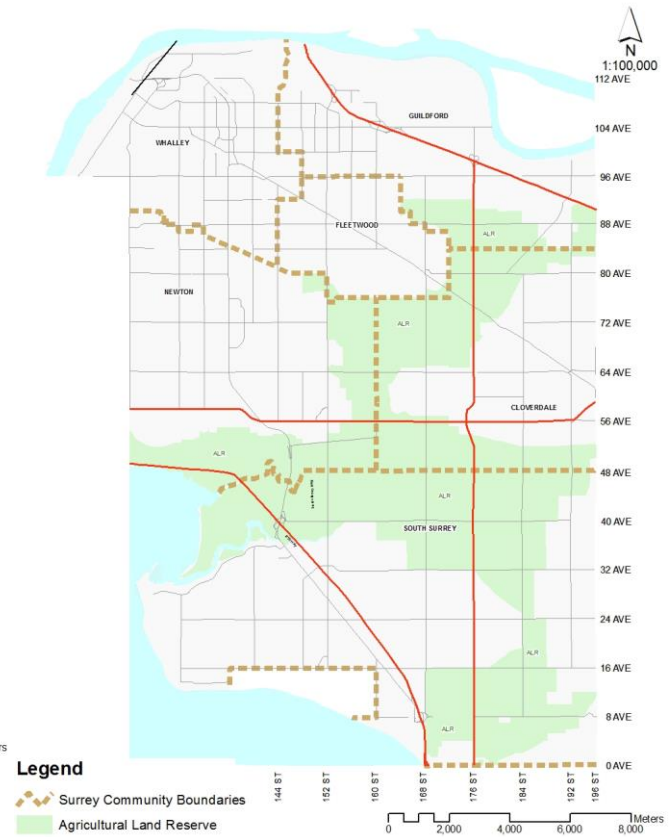
- The City of Surrey Planning & Development Department maintains and updates population and employment within specific areas of Surrey. These include:
 - Generalized Land Uses (Surrey's OCP 2001)
 - Specific Land Uses;
 - Neighbourhood Concept Plans,
 - Local Area Plans,
 - Generalized Land Use Plans, and
 - established communities.
- These subareas are used to identify point features in the building inventory. This information is used for existing and projected unit, population and employment build out scenarios.

Surrey OCP Designated Land Uses and Communities

- Surrey's current OCP Designated Land Uses and Communities.
- Approximately one-third of the city's total land base is agricultural land and the city is home to over 500 farms.



Agricultural Land Reserve



Neighbourhood Concept Plans – Approved Including Stage 1 Approval

- There are 25 Neighbourhood Concept Plans Currently Approved or At Stage 1 Approval.
- There are 5 Neighbourhood Concept Plans Currently Proposed and Initiated

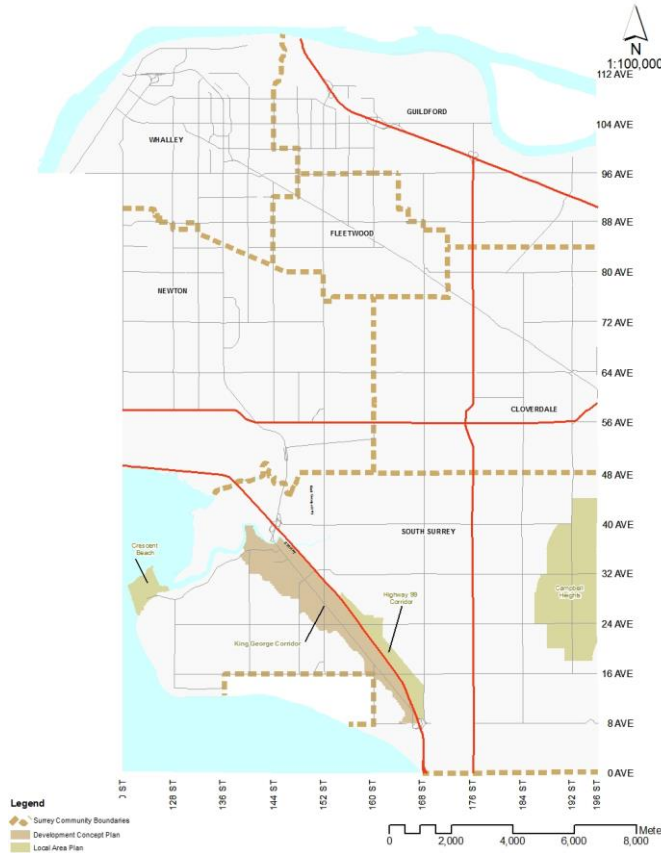


Neighbourhood Concept Plans - Proposed and Initiated

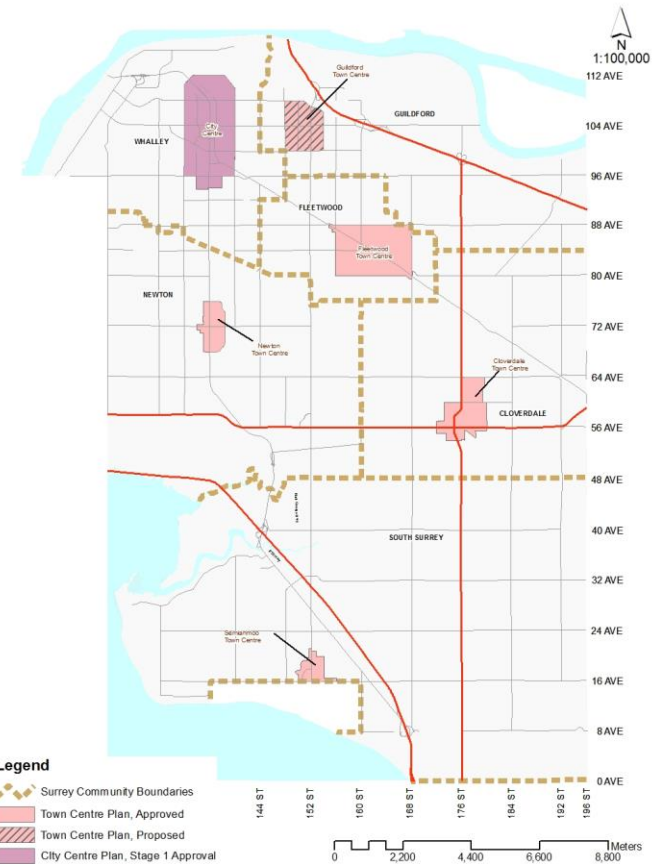


Development Concept and Local Area Plans

- Currently, there is 1 Development Concept Plan and 3 active Local Area Plans.
- Currently, there are 4 approved Town Centre Plans, 1 proposed Town Centre Plan and the City Centre Plan with Stage 1 Approval.

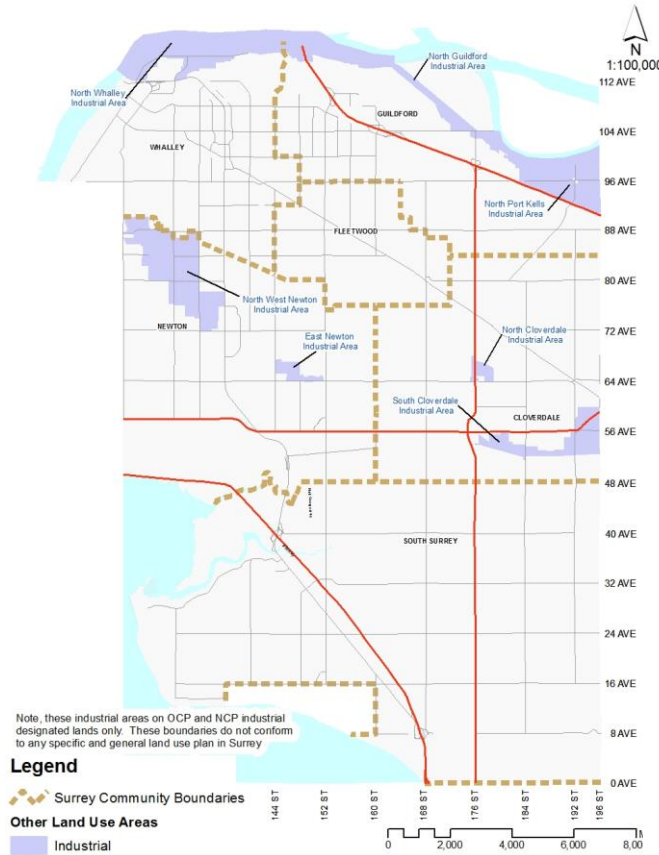


Town Centre and the City Centre Areas

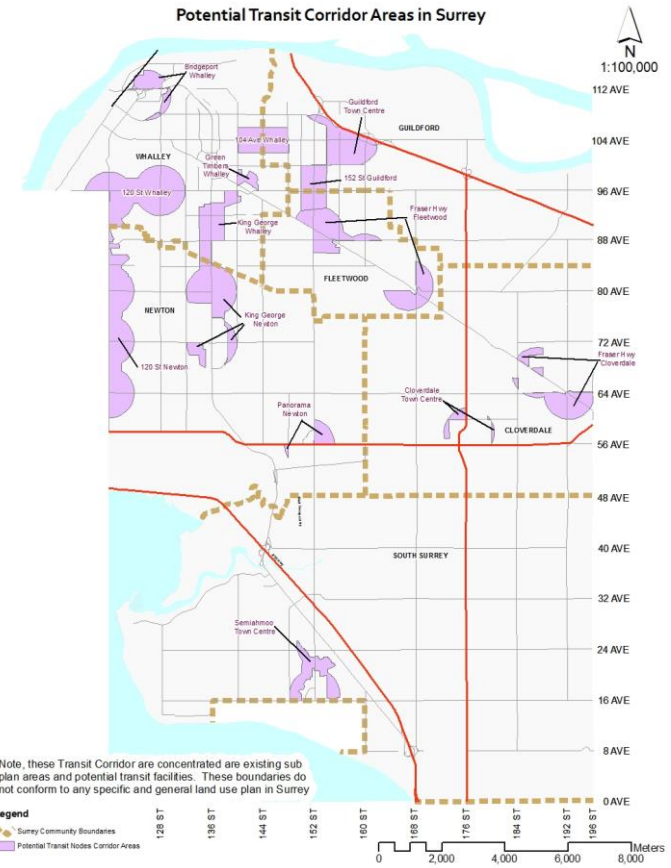


- There are 7 major industrial areas identified in Surrey.
- There are several major transit corridor areas that are identified in Surrey.

Industrial Areas



Potential Transit Corridor Areas



The Building Inventory – Methodology

- The second major component of Surrey's Population Model is the non-GIS component that includes existing and projected (2041) unit, population and employment figures.

Benefits of Surrey's Population Model

- The ability to query unit and population current estimates for any geographic boundary within Surrey;
- The ability to map concentrations or population/employment densities;
- The ability to map spatial distribution by type of development (single family, townhouse, apartment, etc)
- Connection to GIS data, which provides a solid base for Surrey's unit/population projection figures.

Model Output

- Surrey's model also includes attribute information that allows staff to accurately estimate by dwelling type and year, the unit and population figures for any geography within the city.
- Several examples of the model output include;
 - Unit and population figures (existing and projected) by housing type by any geography in the City
 - Spatial analysis that allows for tabulation of unit and population figures (existing and projected) based on any geography in the City.
 - Calculation of unit build out capacities for any geography in the City.
 - Employment figures (existing and projected) for any geography in the City

Total Number of Units Each Year

(based on net number of units added Each Year)

Total Units		Classcode																		
Year	Housing Type	Classcode	Classcode	East Classcode	East Classcode	East Classcode	North	North	West	West	West Classcode	West Classcode	North	South	Classcode	Fraser-Hux			Classcode	
		Transit Corridor	CLUP - Residential	East Classcode	East Classcode	East Classcode	East	West	West Classcode	West Classcode	North Classcode	North Classcode	Industrial Res.	Industrial Res.	Transit Corridor	Transit Corridor	ALR	Outside Planned Areas	Classcode	
2009	Over and Two Family Dwellings	482	230	184	7	33	624	584	78	46	284	37	37	15	228	879	249	4,888	8,458	
	Townhouses	323	0	0	0	0	365	361	0	0	0	0	0	0	347	0	0	88	4,318	
	Apartmental	785	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	524	827	
	Total	1,590	230	184	7	33	989	945	78	46	284	37	37	15	575	1,128	249	5,803	18,593	
2004	Over and Two Family Dwellings	629	310	184	6	33	676	626	288	74	286	37	37	15	228	888	254	4,385	8,332	
	Townhouses	323	0	0	0	0	365	325	48	0	0	0	0	0	347	0	0	88	4,336	
	Apartmental	785	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	524	827	
	Total	1,737	310	184	6	33	1,041	951	336	74	286	37	37	15	575	1,235	254	5,442	14,495	
2002	Over and Two Family Dwellings	627	310	204	5	33	783	778	324	88	286	37	37	14	228	856	253	4,351	8,337	
	Townhouses	323	0	0	0	0	365	325	156	0	0	0	0	0	347	0	0	88	4,488	
	Apartmental	785	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	524	827	
	Total	1,735	310	204	5	33	1,148	1,103	480	88	286	37	37	14	575	1,203	253	5,363	14,652	
2005	Over and Two Family Dwellings	625	310	235	2	33	761	778	482	88	286	37	37	14	228	905	254	4,322	8,755	
	Townhouses	323	0	185	0	0	480	225	163	0	0	0	0	0	347	0	0	88	4,488	
	Apartmental	785	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	524	827	
	Total	1,733	310	420	2	33	1,241	983	645	88	286	37	37	14	575	1,253	254	5,344	14,338	
2004	Over and Two Family Dwellings	624	314	498	4	36	847	382	661	48	286	285	37	16	228	935	254	4,382	18,555	
	Townhouses	323	0	198	0	0	538	225	387	0	0	0	0	0	347	0	0	324	8,328	
	Apartmental	785	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	524	827	
	Total	1,732	314	696	4	36	1,385	607	1,048	48	286	285	37	16	575	1,283	254	5,642	19,414	
2005	Over and Two Family Dwellings	622	314	862	0	36	847	416	773	385	283	37	16	18	228	938	254	4,445	18,568	
	Townhouses	323	0	452	0	0	538	225	373	18	0	0	0	0	347	0	0	324	8,722	
	Apartmental	785	0	168	0	0	0	0	0	0	0	0	0	0	0	0	0	524	827	
	Total	1,730	314	1,422	0	36	1,385	641	1,153	383	283	37	16	18	575	1,283	254	5,339	18,649	
2006	Over and Two Family Dwellings	622	314	1,518	0	36	847	485	834	488	288	37	16	0	228	939	254	4,219	19,636	
	Townhouses	323	0	1,833	27	37	538	326	379	18	0	0	0	0	388	0	0	324	8,274	
	Apartmental	785	0	288	52	0	0	0	148	0	0	0	0	0	0	0	0	524	8,236	
	Total	1,730	314	2,644	79	73	1,385	811	1,361	616	288	37	16	0	616	1,319	254	5,367	18,744	
2007	Over and Two Family Dwellings	659	316	1,518	0	33	853	578	857	628	288	37	16	0	228	936	253	4,387	19,821	
	Townhouses	323	0	1,388	133	37	538	433	551	18	0	0	0	0	388	0	0	324	8,629	
	Apartmental	785	0	316	184	0	0	0	0	0	0	0	0	0	0	0	0	524	8,468	
	Total	1,767	316	3,222	217	70	1,391	1,011	1,388	646	288	37	16	0	616	1,324	253	5,235	19,918	
2008	Over and Two Family Dwellings	657	316	1,882	0	38	853	686	882	449	278	36	16	0	228	931	254	4,822	19,839	
	Townhouses	323	0	1,655	123	118	531	436	431	18	0	0	0	0	388	0	0	324	8,635	
	Apartmental	788	0	326	184	0	0	0	258	0	0	0	0	0	0	0	0	524	8,234	
	Total	1,768	316	3,863	217	259	1,390	1,182	1,673	487	278	36	16	0	616	1,341	254	5,812	19,393	
2009	Over and Two Family Dwellings	656	316	2,333	0	48	861	685	857	662	278	36	16	0	228	936	253	4,625	19,828	
	Townhouses	323	0	1,473	133	288	538	518	431	18	0	0	0	0	388	0	0	324	8,434	
	Apartmental	788	0	332	184	0	0	0	258	0	0	0	0	0	0	0	0	524	8,237	
	Total	1,767	316	4,138	217	583	1,422	1,284	1,638	688	278	36	16	0	616	1,346	253	5,379	18,488	
2010	Over and Two Family Dwellings	656	316	2,557	0	43	863	784	1,084	519	278	36	16	0	228	936	253	4,658	19,385	
	Townhouses	323	0	1,645	133	288	538	532	431	18	0	0	0	0	388	0	0	324	8,636	
	Apartmental	788	0	338	184	0	0	0	258	0	0	0	0	0	0	0	0	524	8,245	
	Total	1,767	316	4,540	217	723	1,401	1,324	1,832	611	278	36	16	0	616	1,346	253	5,407	18,264	
2011	Over and Two Family Dwellings	656	316	2,645	0	53	868	755	1,044	538	274	37	16	0	228	936	253	4,599	18,618	
	Townhouses	323	0	1,675	126	288	531	578	431	18	0	0	0	0	388	0	0	324	8,634	
	Apartmental	788	0	338	184	0	0	0	258	0	0	0	0	0	0	0	0	524	8,260	
	Total	1,767	316	4,658	218	829	1,401	1,356	1,536	626	274	37	16	0	616	1,346	253	5,427	18,512	
2012	Over and Two Family Dwellings	656	316	2,618	0	63	871	816	1,042	558	276	37	16	0	228	936	258	4,248	18,818	
	Townhouses	323	0	1,848	132	473	624	624	431	18	0	0	0	0	388	0	0	324	8,242	
	Apartmental	788	0	348	184	0	0	0	258	0	0	0	0	0	0	0	0	524	8,229	
	Total	1,767	316	4,814	216	1,182	1,505	1,482	1,536	626	276	37	16	0	616	1,346	258	5,404	18,364	

- Net number of units broken down by Surrey's Communities and sub area plans including ALR, industrial and transit corridor areas.

Output of Model

Several products can be produced from the model given any geography with Surrey. These include:

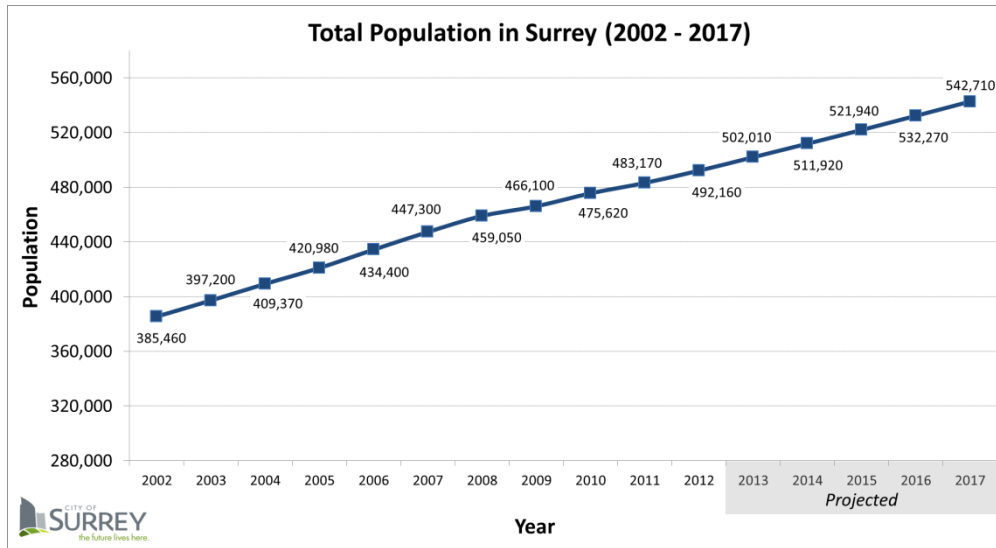
- Number of units.
- Total and average residential floor area by housing type (*single family, town house, apartment etc*).
- Average household size by residential type.
- Population
- Employment
- Total and average non-residential floor area by building type (*commercial, industrial, institutional, farm related etc*)
- Worker density ratios by building or employment type.
- Density (*including units, population and employment*).
- Provides a solid base for projections (*including floor space, units, population, average household size and employment, worker density ratios*).
- Construction year.
- Non-market housing.

Output of Model

Other benefits include:

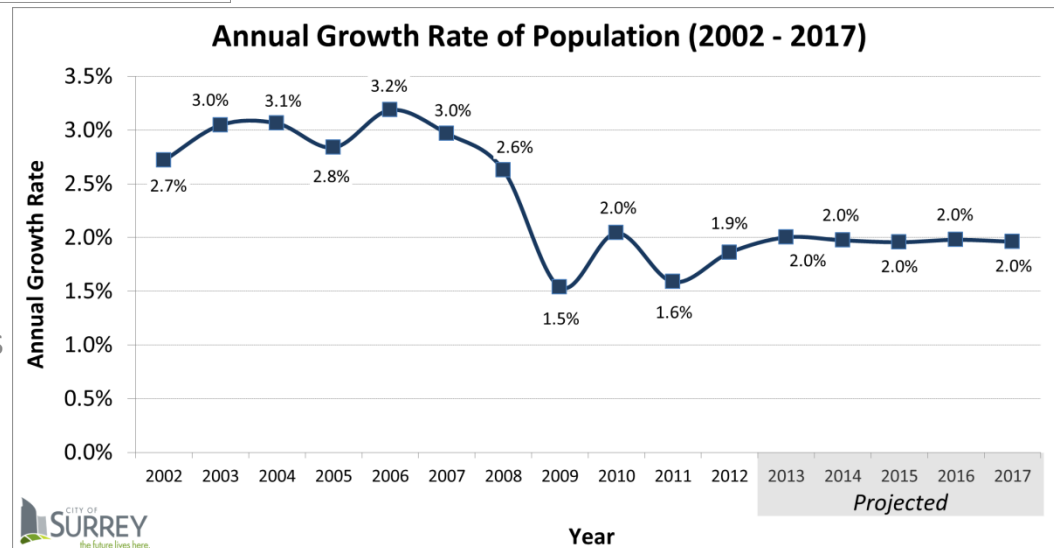
- Tie into the housing market data (*Fraser Valley Real Estate Board*).
- Engineering traffic studies (*traffic zones*).
- Transit corridor studies
- Agricultural Land Reserve Inventory
- Industrial Land Inventory.
- Sub plan build out scenarios.
- School Board school existing and enrollment projections
- Community Safety (RCMP and Fire).
- Market analysis for small business.
- Verify census information.

Total Population and Growth Rate of Residential Development (2002 - 2017)

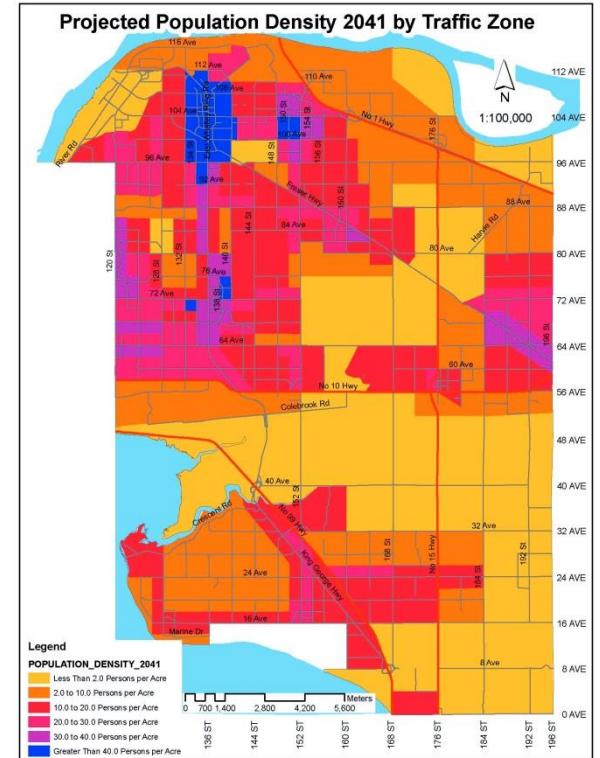
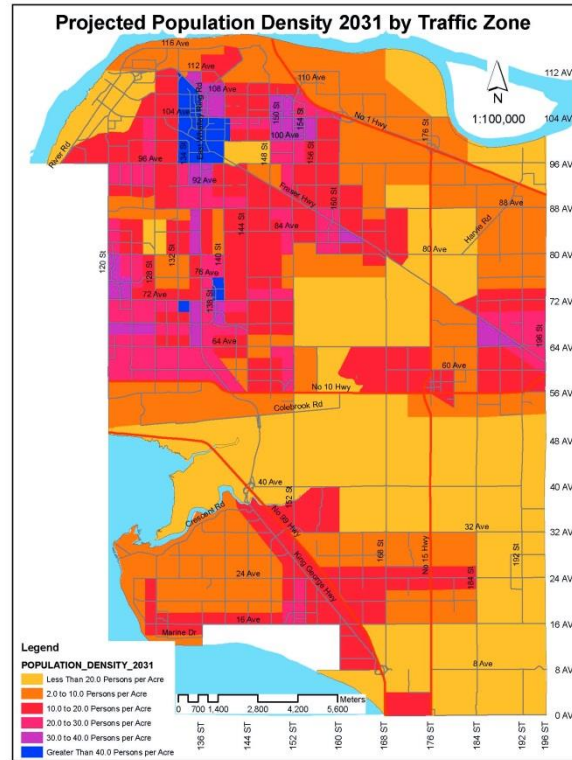
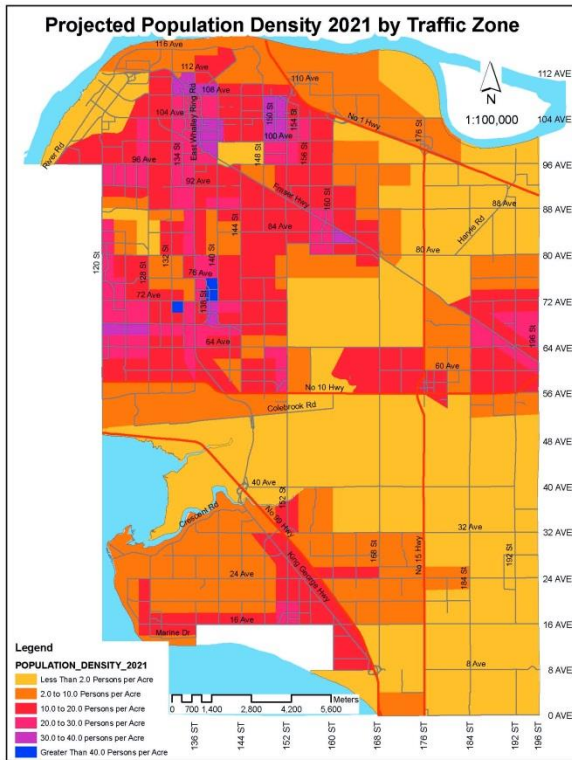


- There are 21,482 units in the application process which will provide for housing for the next 5 years based on Surrey's estimated annual population growth rate. 84.1% are multifamily.

- Surrey's total population estimated at 492,160 residents (December 2012).
- Approximately 106,700 new Surrey residents the past decade - average annual growth rate of 2.77%.
- Population growth of up to 50,550 residents is projected in the five years between 2012 and 2017.

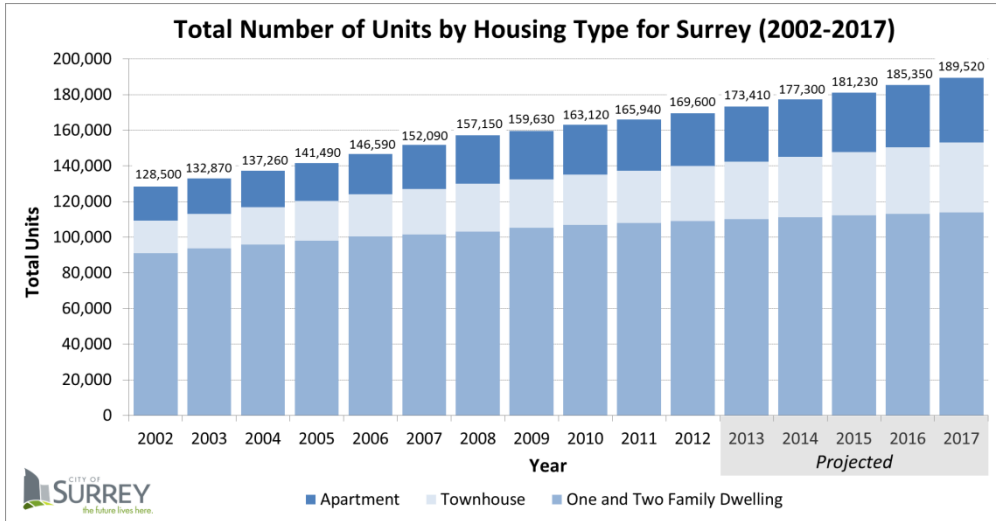


Projected Population Density by Traffic Zone



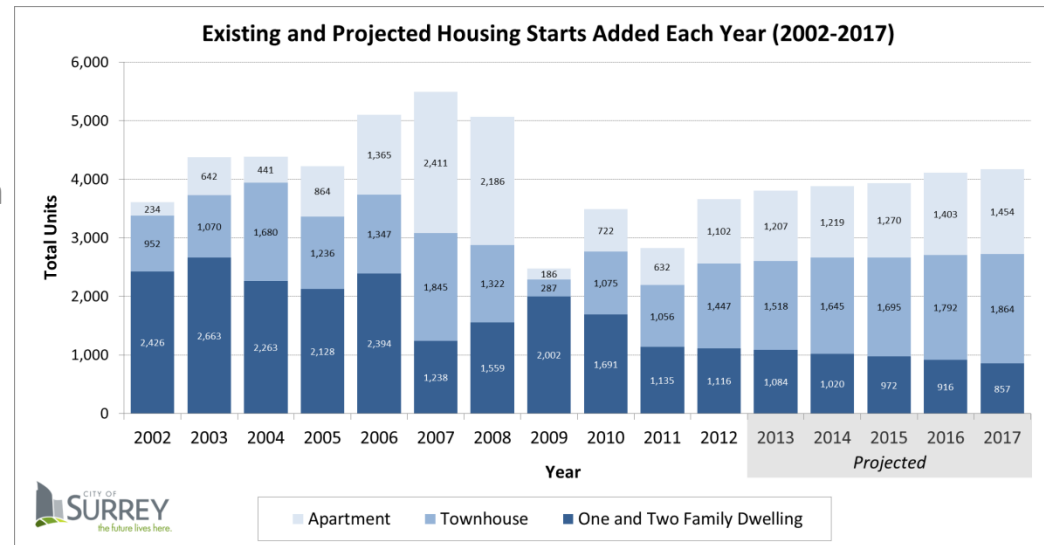
- Population Densities for 2021, 2031 and 2041.
- Issues with traffic zone polygons that do not match Surrey's sub plan boundaries.

Number of Units by Housing Type and Existing and Projected Housing Starts (2002 - 2017)



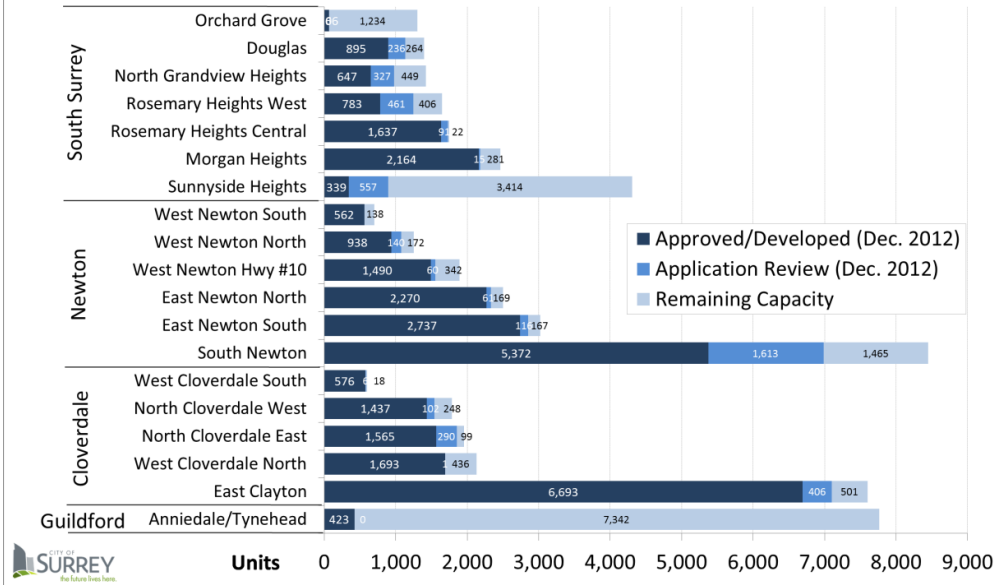
- In 2012, 3,665 net units were built – approximately 10,629 new residents.
- The estimated 3,980 units per year over the next 5 years.

- 169,600 residential units in the City (December 2012)
- Approximately 19,920 units will be added in the next five years.
- In 2002, 29.2% of units were multi-family. Increase to 35.6% in 2012 and anticipated 40% of stock by 2017.



NCP and Town Centre Residential

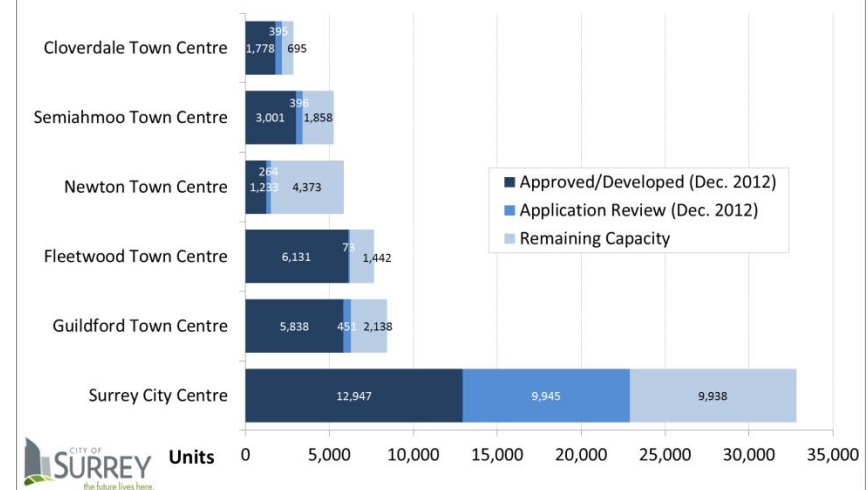
NCP Residential Development



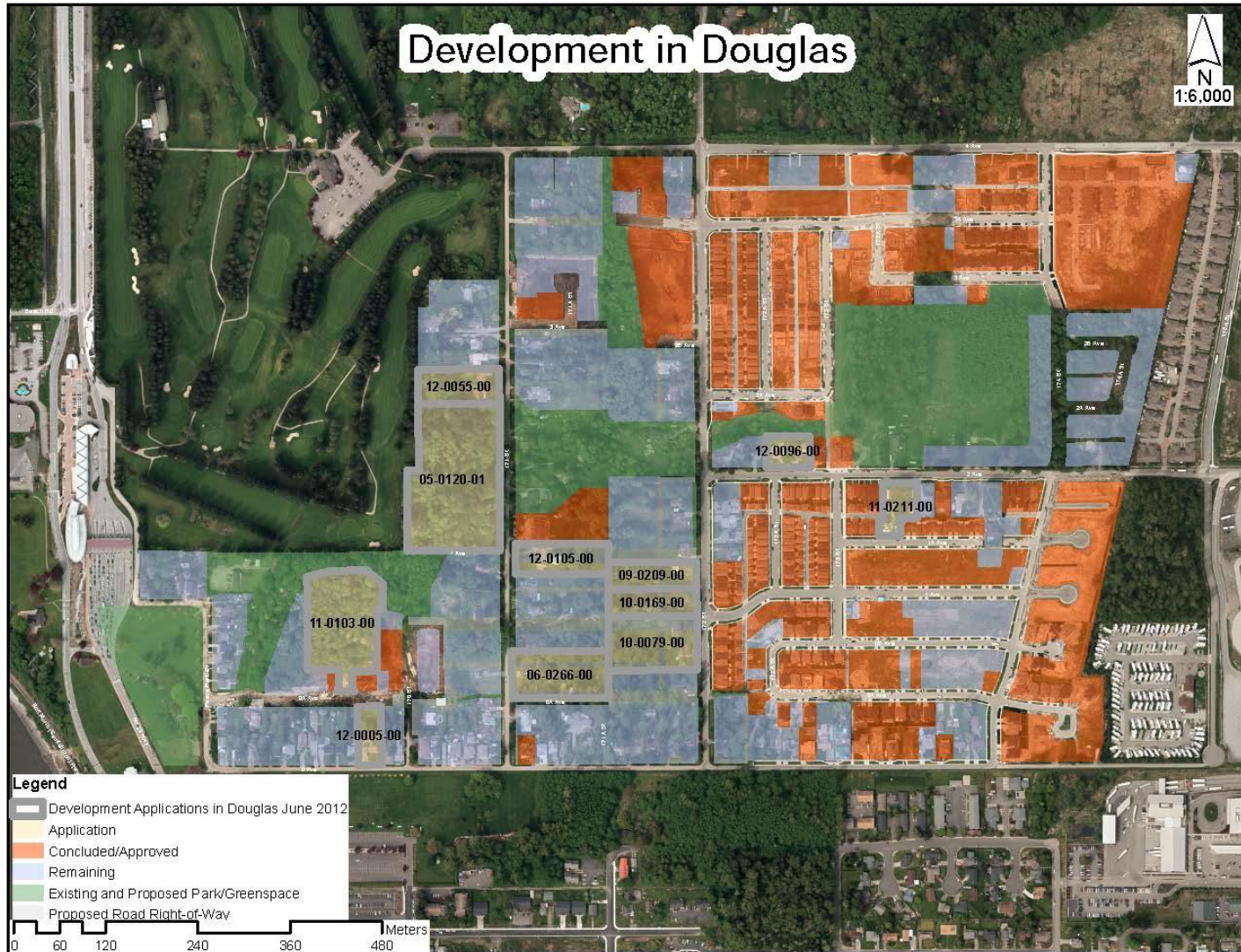
- Within approved NCPs that provide a total capacity of 53,936 dwelling units, which will accommodate up to approximately 157,576 residents, assuming 2.9 ppu (based average household size of in Surrey's approved NCP areas in 2012).

- Surrey's City Centre and Town Centres that provide a total capacity of 62,896 dwelling units, which will accommodate up to approximately 141,292 residents, assuming 2.2 ppu (based average household size of in Surrey's City Centre and Town Centres in 2012)

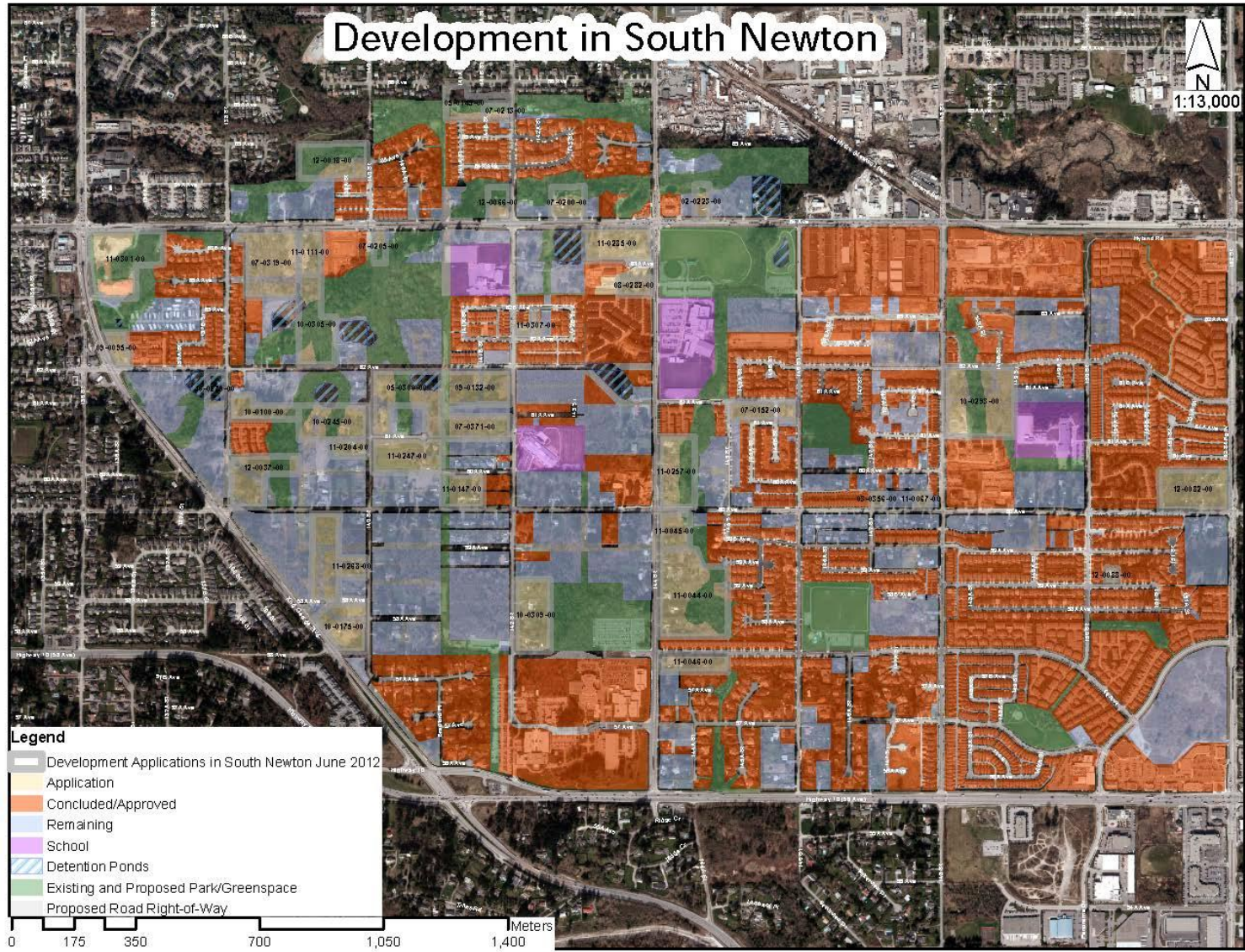
City Centre and Town Centre Residential Development



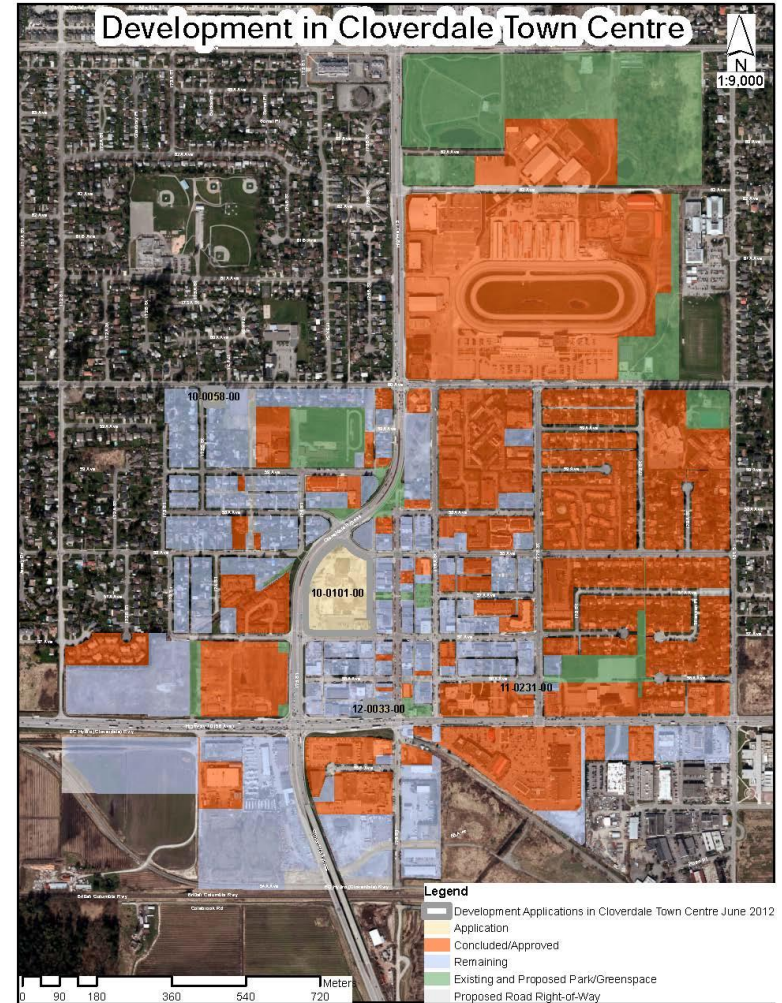
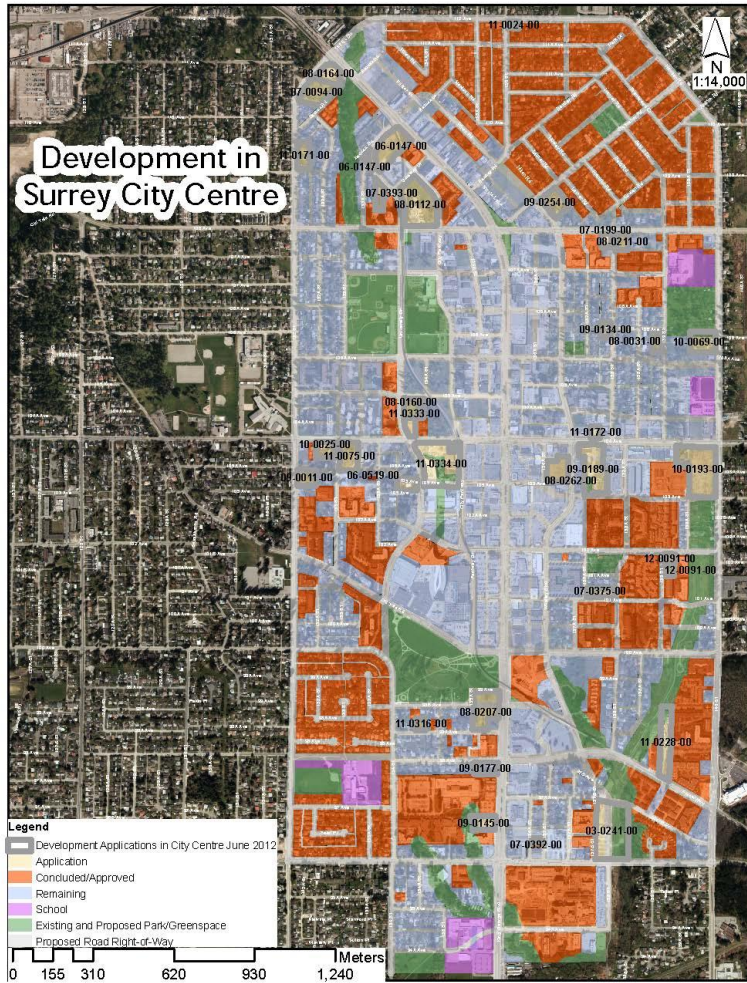
NCP Residential Potential Development



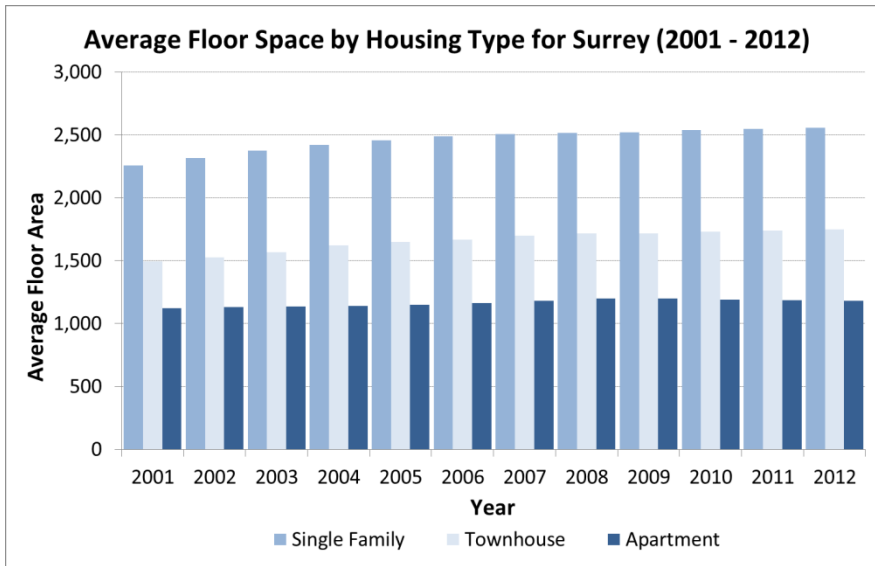
NCP Residential Potential Development



Town Centre Residential Potential Development

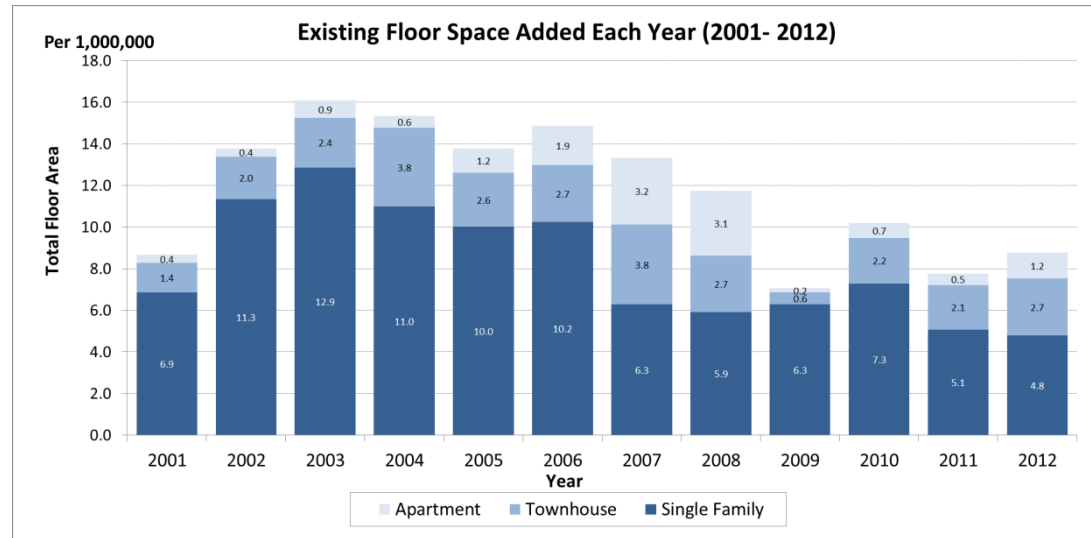


Residential Floor Space in Surrey (2001 to 2012)

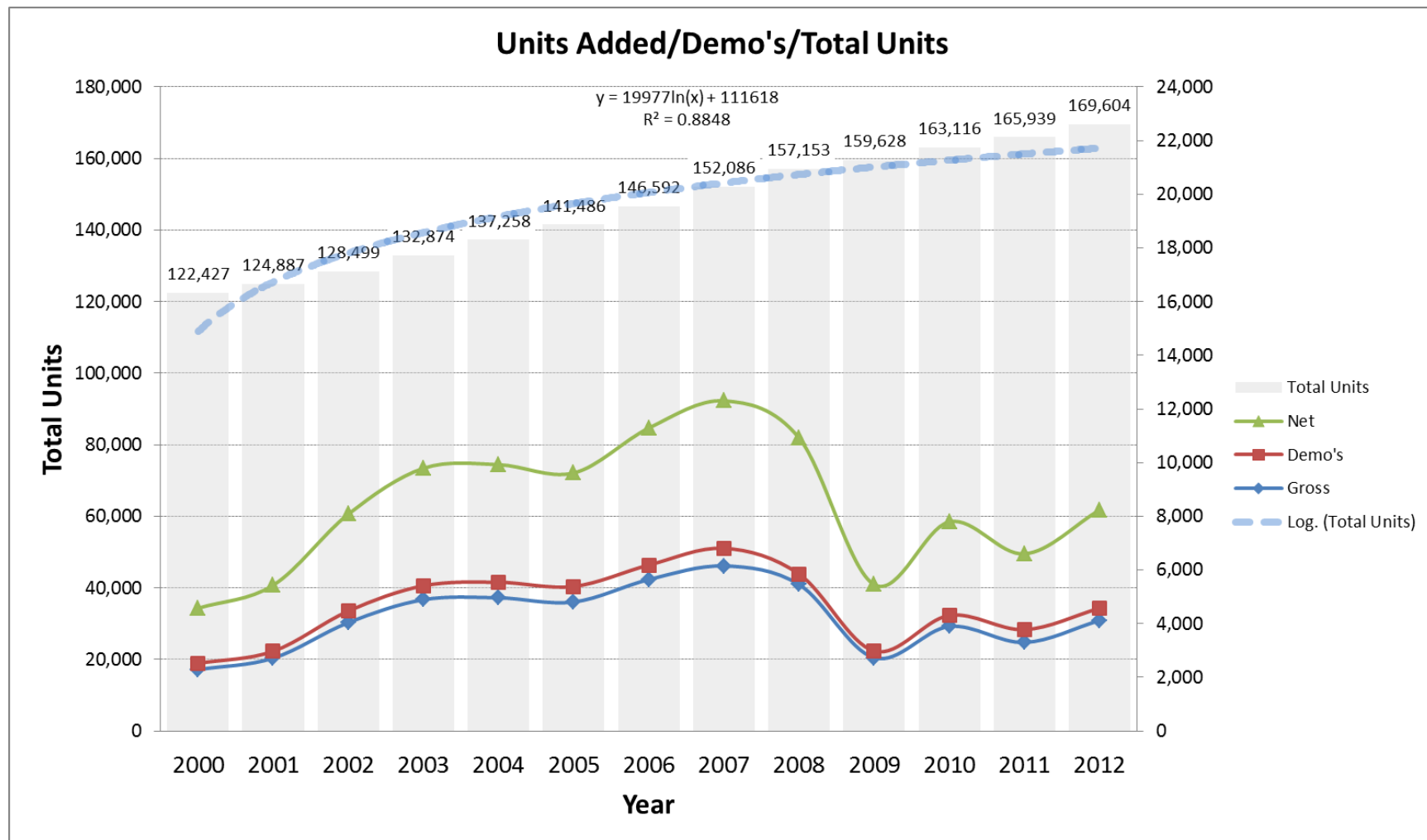


- Over the last 10 years, residential unit sizes have increase but in the last 3 years, have leveled off .

- In 2012 there was 8,770,270 sq.ft. of residential floor space added in Surrey.
- Single family construction accounted for approximately 4.8 million square feet while multi-family accounted for approximately 3.9 million square feet.



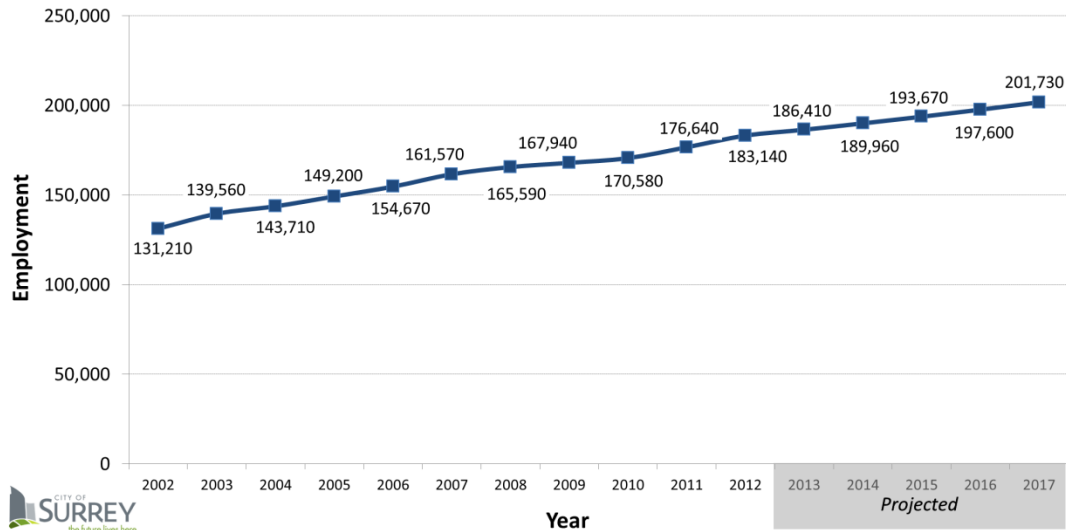
Residential Development Trends in Surrey (2000 to 2012)



- The overall trend for residential development in Surrey is slowing down.

Employment

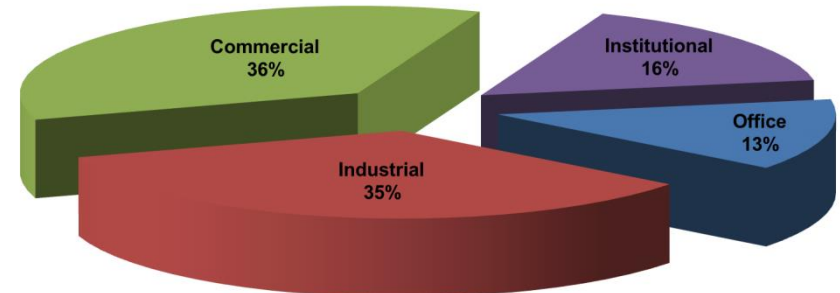
Existing and Projected Total Employment in Surrey



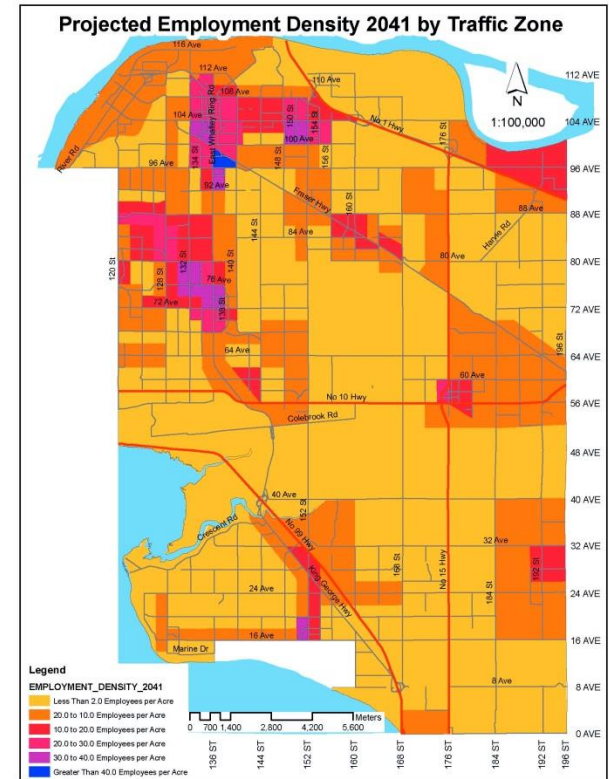
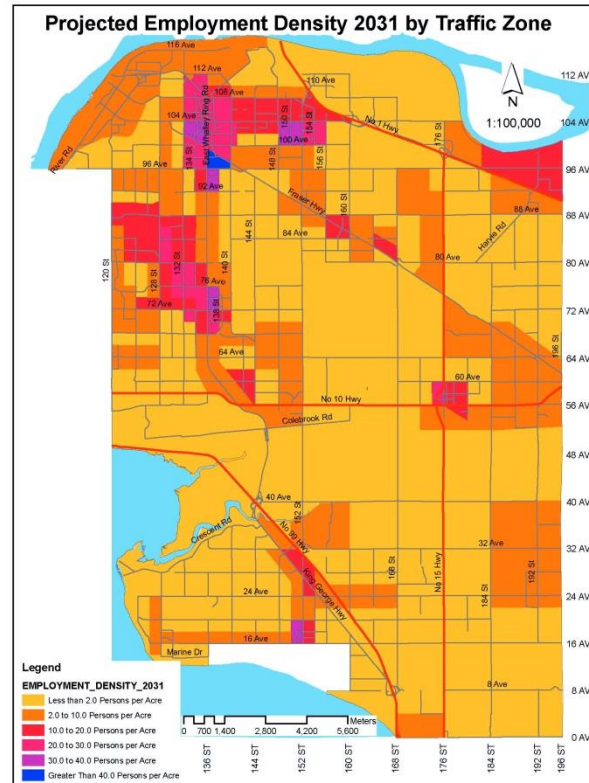
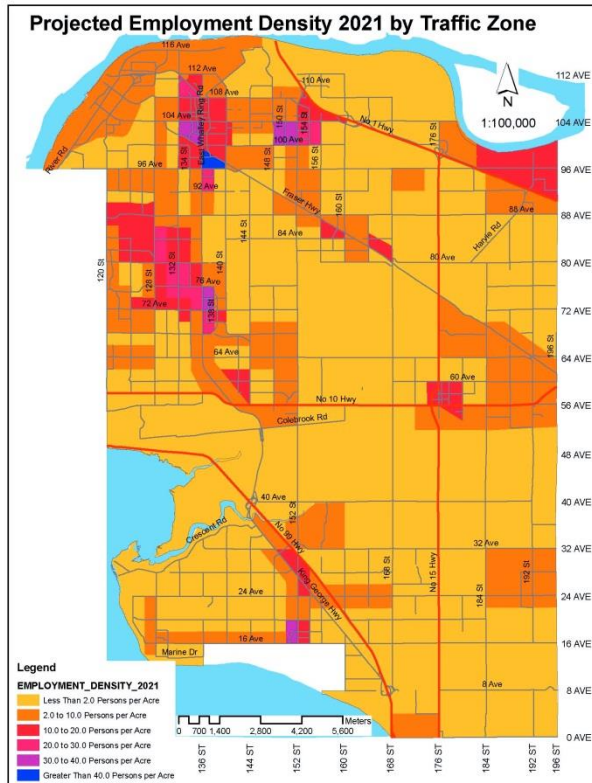
- There were approximately 6,500 jobs added in 2012.
- The largest proportion of employment added in Surrey was institutional (*approx. 2,380 jobs*) followed by commercial (*approx. 2,020 jobs*) followed by office (*approx. 1,400 jobs*) then industrial (*approx. 700 jobs*).

- Surrey's total employment is estimated at 183,140 (December 2012).
- Approximately 51,930 new jobs in the past decade - average annual growth rate of 3.4%.
- Employment growth of up to 18,590 residents is projected in the five years between 2012 and 2017.

Employment (2012) by Type as a Percentage of Total Employment



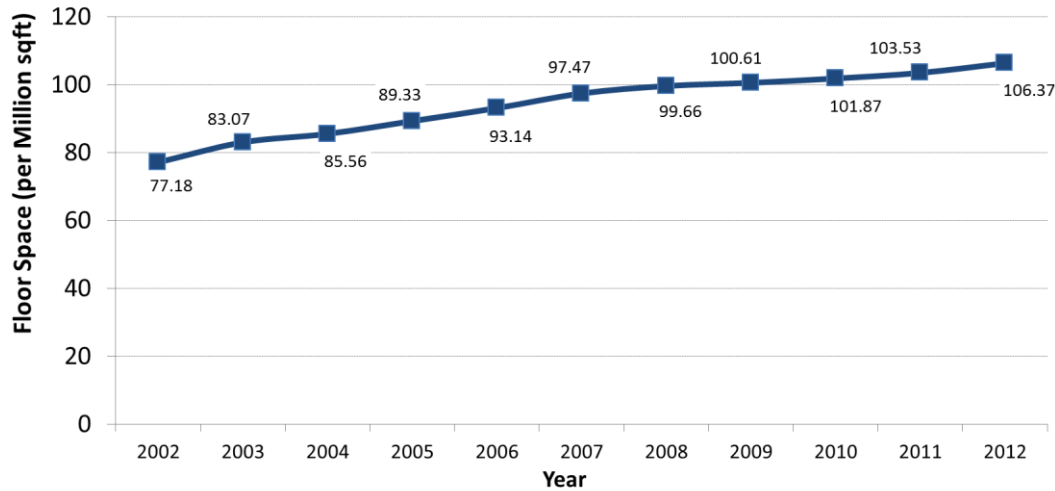
Projected Employment Density by Traffic Zone



- Employment Densities for 2021, 2031 and 2041.
- Issues with traffic zone polygons that do not match Surrey's sub plan boundaries.

Non-residential Floor Space

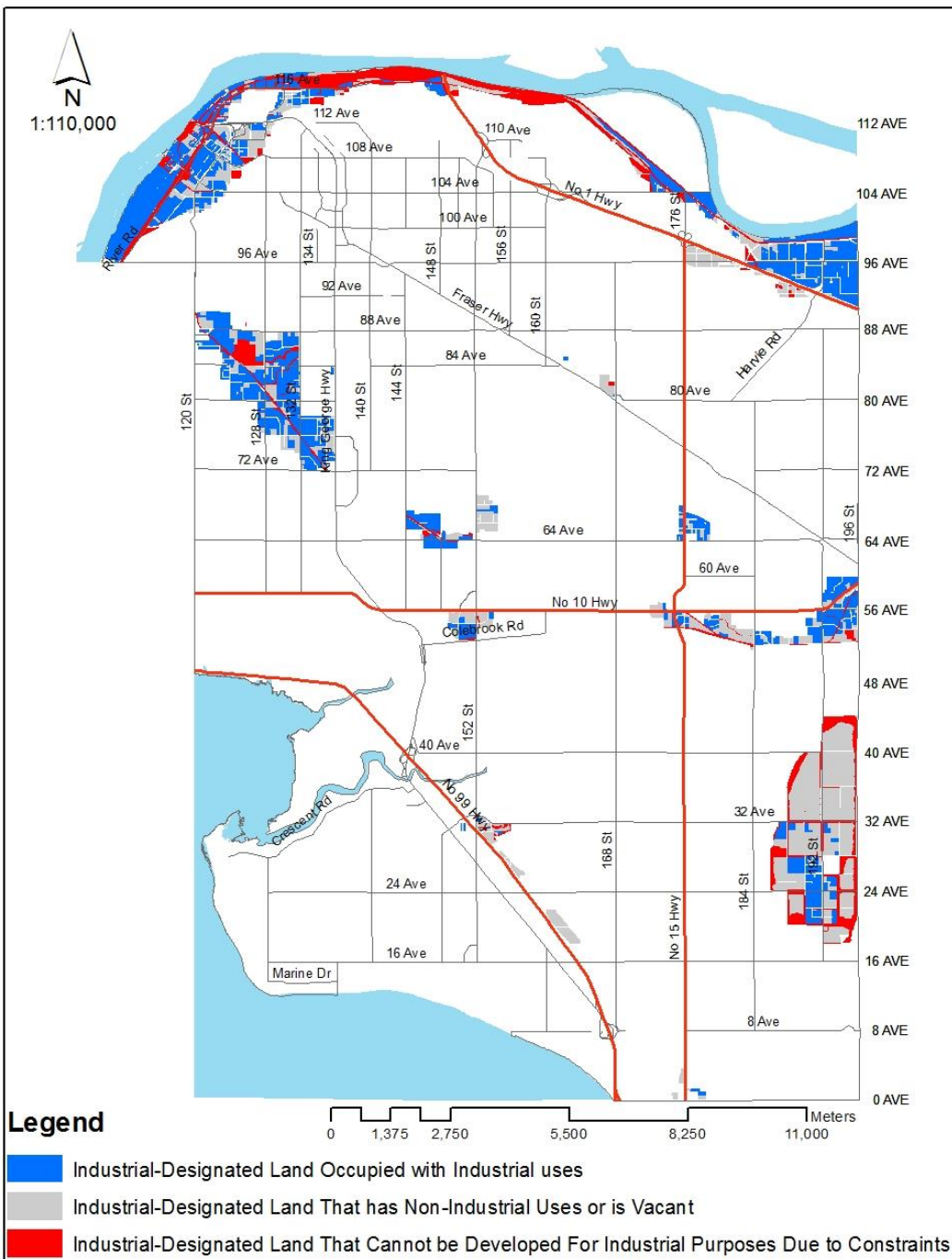
Total Nonresidential Floor Space in Surrey (2002 - 2012)



- In 2012 Surrey had approximately 106.37 million square feet of non-residential floor space.
- Approximately 2.8 million square feet of non-residential floor space added in 2012.
- Institutional floor space added accounted for 55% (1,559,350 square feet) of total non-residential floor space added in 2012.

- Overall “Worker Density Ratios” by employment type vary considerably in Surrey.
- Office WDRs are the smallest (1 employee for every 249 square feet) compared to institutional (1 employee for every 836 square feet).

Year	Office	Industrial	Commercial	Institutional
2006	251	548	631	974
2007	252	550	626	974
2008	252	554	621	974
2009	256	554	620	952
2010	257	556	617	952
2011	258	558	616	852
2012	249	559	607	836

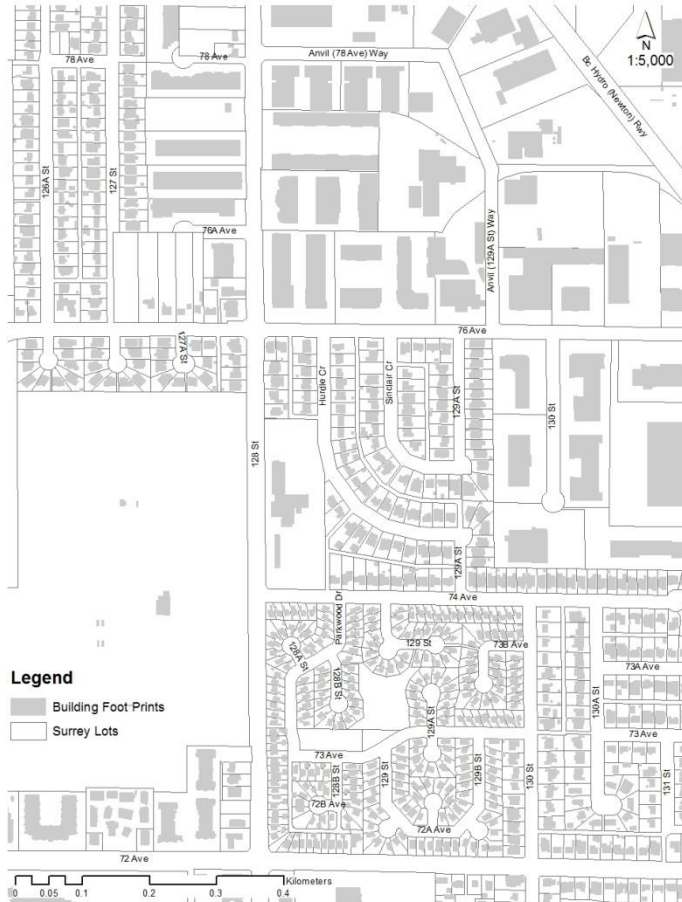


Industrial Land in Surrey

- Total Industrial-Designated Land – 7,370 acres
- Industrial-Designated Land Occupied with Industrial Uses – 3,247 acres
- Industrial-Designated Land That has Non-Industrial Uses or is Vacant – 2,637 acres
- Industrial-Designated Land That Cannot Be Developed For Industrial Purposes Due to Constraints – 1,486 acres

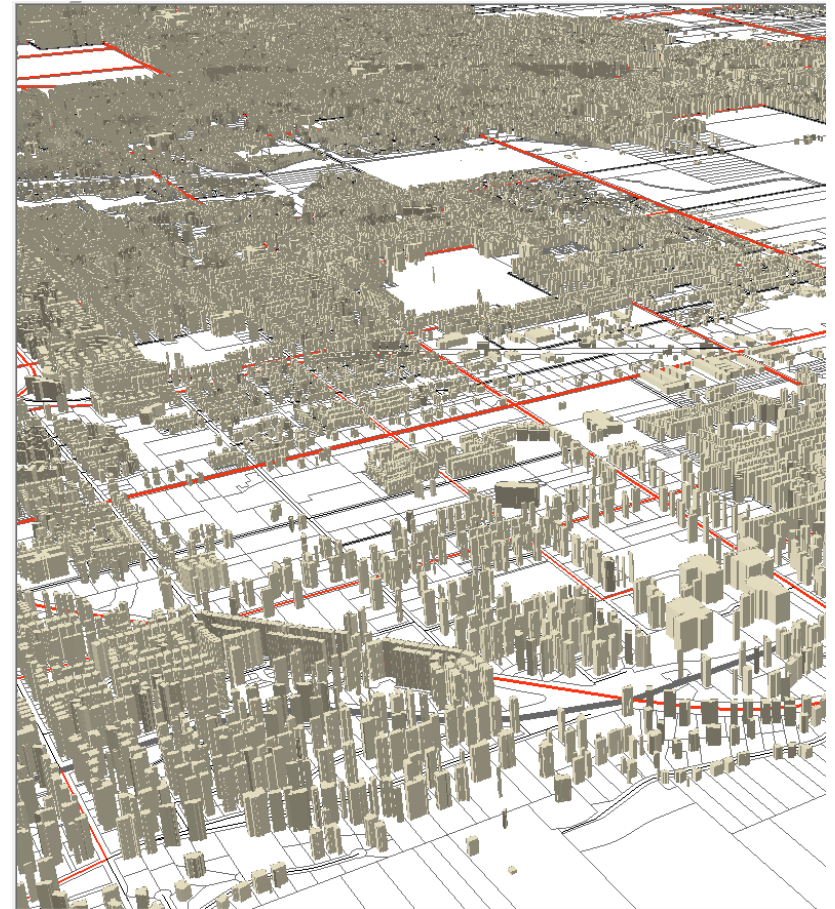
From 2D to 3D

Surrey's 2D Building Foot Prints



- Converting 2D building foot print data into 3D data using elevation.

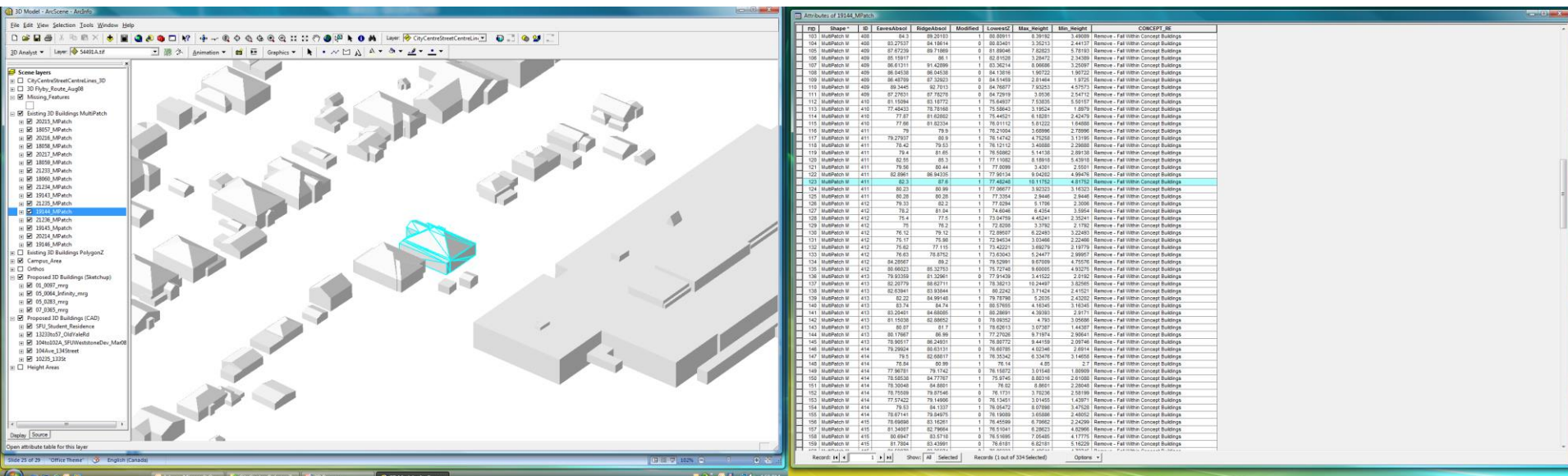
Surrey's 3D Building Foot Prints



True 3D Model Components

- GIS 3D buildings MultiPatch files
 - Are less complex than PolygonZ files 3D building type files.
 - Multipatch 3D files contain simplified attribute information that include only one row of data in the attribute table that describe the building.
 - The advantage is related to memory storage. Multipatch files take up less memory than PolygonZ files.

MultiPatch type GIS 3D files

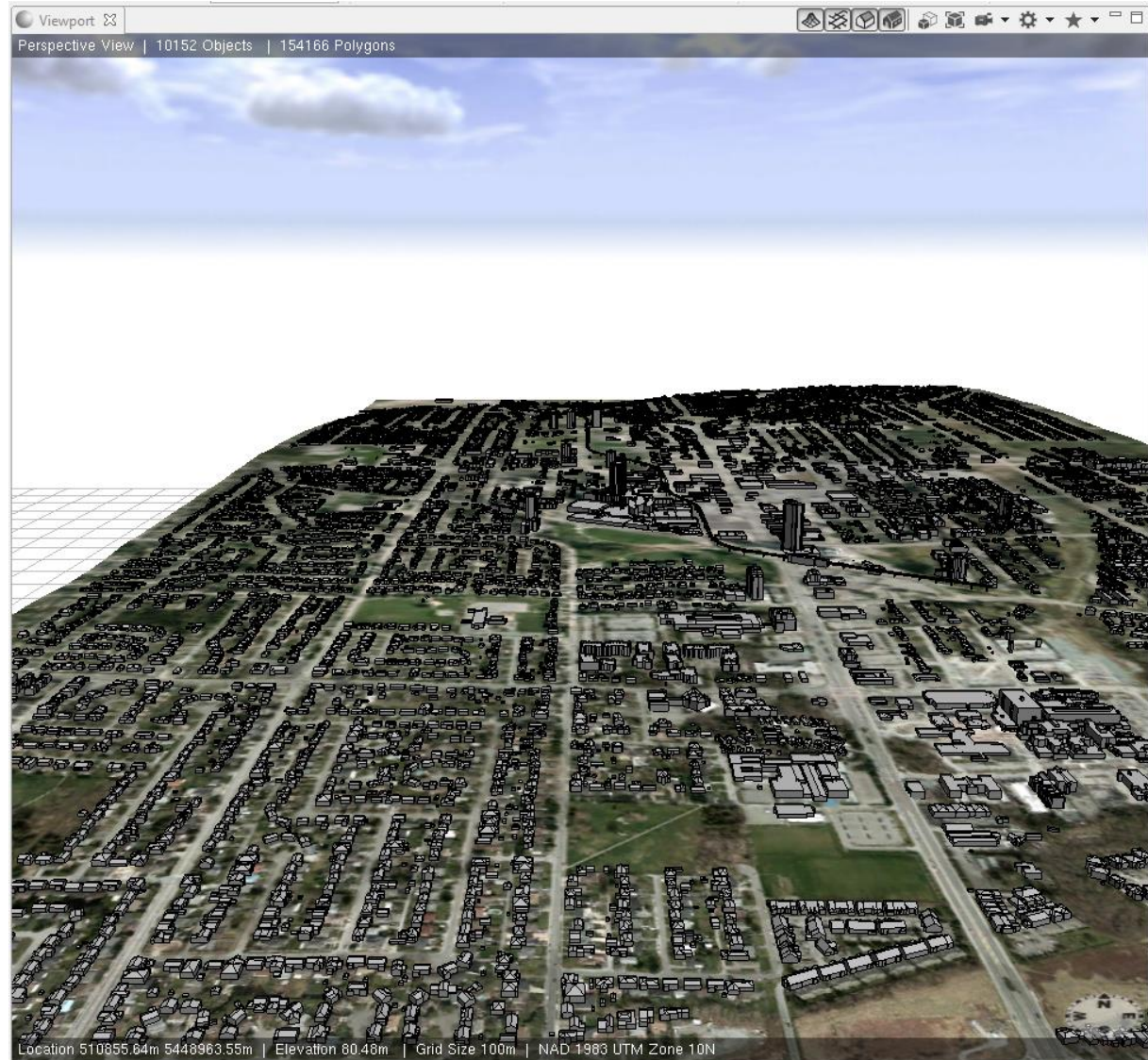


The screenshot displays the ArcGIS 3D Model Builder interface. On the left, a 3D perspective view of a city model is shown, with various buildings rendered in grey. A red wireframe box highlights a specific building. The right side of the interface shows the 'Attributes of 2144.MPACH' table, which lists the attributes for each building in the MultiPatch file.

ID	Shape	Area	Volume	Height	LowestZ	Max_Height	Min_Height	CONCEPT
101	MultiPatch	481	86.2151	86.2151	0	86.2151	8.3916	2.9089
104	MultiPatch	489	83.2757	84.1814	0	86.8341	3.35213	2.44137
105	MultiPatch	489	87.63229	89.71889	0	81.65648	7.93253	5.1918
106	MultiPatch	489	88.11917	86.11	0	82.1528	3.28472	2.34389
107	MultiPatch	489	86.61311	87.82889	0	84.34214	6.66566	3.25897
108	MultiPatch	489	86.04538	86.04538	0	84.13818	1.99722	1.99722
109	MultiPatch	489	86.47389	87.29283	0	84.1485	2.81464	1.9725
110	MultiPatch	489	88.3445	82.7915	0	84.68977	9.62553	4.67973
111	MultiPatch	489	87.27631	87.62791	0	84.72819	3.6306	2.54712
112	MultiPatch	410	81.16984	83.18752	1	75.64827	7.33035	5.6187
113	MultiPatch	410	77.48433	78.78189	1	75.58843	3.19524	1.6879
114	MultiPatch	410	77.87	81.62682	1	76.4821	6.18201	2.64378
115	MultiPatch	410	77.88	81.82334	1	76.61112	5.61222	1.64888
116	MultiPatch	411	81	79.3	1	76.1504	2.65966	2.5996
117	MultiPatch	411	79.27937	80.39	1	76.14742	4.76265	3.11395
118	MultiPatch	411	76.462	79.851	1	76.1713	3.46888	2.58888
119	MultiPatch	411	79.4	81.85	1	76.50882	5.14138	2.69138
120	MultiPatch	411	82.55	85.5	1	77.11882	6.18915	5.63915
121	MultiPatch	411	79.56	82.44	1	77.8988	3.4591	2.5681
122	MultiPatch	411	82.8861	86.84335	1	77.98134	9.04202	4.99479
123	MultiPatch	411	82.83	82.83	1	77.84248	18.17928	4.81762
124	MultiPatch	411	80.23	80.88	1	77.69877	3.82323	3.14323
125	MultiPatch	411	80.283	80.283	1	77.2054	2.8446	2.8446
126	MultiPatch	410	79.33	82.3	1	77.8284	5.1798	2.3098
127	MultiPatch	410	78.2	81.844	1	74.6548	6.4554	3.5564
128	MultiPatch	410	75.4	77.5	1	73.04789	4.45841	2.35841
129	MultiPatch	410	76	76.2	1	72.8308	3.3792	2.1792
130	MultiPatch	410	76.142	79.32	1	72.89887	6.24483	2.24483
131	MultiPatch	410	75.17	76.88	1	72.84534	3.03486	2.2486
132	MultiPatch	410	76.62	77.155	1	73.82321	3.88978	2.97978
133	MultiPatch	410	76.63	78.8752	1	73.82643	5.24477	2.89977
134	MultiPatch	410	86.28697	89.2	1	79.29891	9.67698	4.57698
135	MultiPatch	410	86.86623	86.37953	1	75.52748	9.60985	4.83278
136	MultiPatch	410	79.93388	81.26661	0	77.9428	3.1622	2.1622
137	MultiPatch	410	82.20778	88.6711	1	78.39313	10.24487	3.62685
138	MultiPatch	410	82.83841	83.83841	0	80.2242	3.7424	2.1521
139	MultiPatch	410	82.22	84.89148	0	78.89786	6.2095	2.6095
140	MultiPatch	410	83.74	84.74	0	85.7895	4.16345	3.16345
141	MultiPatch	410	83.24451	84.68883	0	86.28891	4.39393	2.8171
142	MultiPatch	410	81.15038	82.88852	0	78.93832	4.793	3.65888
143	MultiPatch	410	80.87	81	0	82.48387	1.97887	1.97887
144	MultiPatch	410	86.17967	86.98	1	77.27628	9.71874	2.86841
145	MultiPatch	410	78.05617	86.24931	1	76.89712	8.41818	2.87148
146	MultiPatch	414	79.29524	80.63131	0	80.68789	4.02348	2.8814
147	MultiPatch	414	79.5	82.08817	1	76.35342	6.33476	3.1488
148	MultiPatch	414	79.84	80.98	0	76.14	4.89	2.1
149	MultiPatch	414	77.86781	79.1742	0	76.18872	3.1548	1.88889
150	MultiPatch	414	78.58538	84.77827	0	76.3746	8.88218	2.1888
151	MultiPatch	414	78.30048	84.8881	0	78.82	8.8881	2.88848
152	MultiPatch	414	79.19289	79.87461	0	77.1713	3.82036	2.82036
153	MultiPatch	414	77.57423	78.14896	0	76.13481	3.01485	1.43871
154	MultiPatch	414	79.83	84.13387	0	76.62472	8.87888	3.18288
155	MultiPatch	414	78.6741	79.94975	0	76.18888	3.68888	2.4888
156	MultiPatch	410	78.88888	83.18281	1	76.45888	6.78882	2.2488
157	MultiPatch	410	81.24887	82.78881	1	76.15881	6.28882	4.2888
158	MultiPatch	410	80.88847	83.5781	0	76.18888	7.04888	4.17778
159	MultiPatch	410	77.78842	83.88881	0	77.78842	6.82881	6.82881

True 3D Data – ESRI's City Engine

- CityEngine is a simple-to-use, 3D city editing and visualization tool.
- It allows for creation and maintenance of 3D city scenes.
- Provides the option to share 3D City Scenes to ArcGIS Online.



Future Concept of 3D Data

City Centre (South looking North along King George Hwy) Concept Buildings



City Centre (East looking West) Concept Buildings



Summary

- Surrey's model includes attribute information that allows staff to accurately estimate by dwelling type and year, the unit, population and employment figures for any geography within the city.
- Surrey's population model incorporates assumptions based on Census information, including a unit undercount estimate and average household size.
- Based on the latest Census undercount information, derived estimated population from both the City of Surrey and Statistics Canada is similar.
- This adds a level of confidence to the City of Surrey estimates, and forms a solid base for projecting unit and population figures over the next 30 years.
- Future prospects include integration into a 3D environment.

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