SPACES, PLACES AND POSSIBILITIES

Summary of Systems Model and Scenario Development

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RESEARCHERS

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BACKGROUND

This focus group session is part of a research project entitled *Places, Spaces and Possibilities*. The major objectives of the research project are to:

1. Model potential outcomes of different development directions for the community of Squamish.
2. Develop realistic interactive visualizations for a specific smaller neighbourhood within Squamish, based on the 'community development scenarios'.

The purpose of this focus group was to generate community development scenarios for the modelling and the subsequent visualization activities. The focus group built on scenario ideas that were created in conjunction with the District of Squamish's Community Planning and Infrastructure Department, largely during a preliminary scoping meeting in March, 2018. Following this meeting, four scenario ideas were created that encapsulated many variables but focused primarily on density. Characterizing them in terms of relative density, these scenario ideas can be simply described as:

1. low-density residential neighbourhoods,
2. medium-density row housing and low-rise condo neighbourhoods,
3. medium-density high(er)-rise neighbourhoods, and
4. high-density community nodes.

During the scoping meeting, the Loggers East neighbourhood was identified as a potential candidate for visualizations. Loggers East is a suitable candidate because of its relatively low level of current development, its central location, and its potential to be either highly developed or remain less developed. There are also interesting complexities that can be explored in the area related to agricultural activities, potential for steep-slope development, flood hazard lands, trail connections, commercial areas, and ecological sensitive zones.

The April session consisted of both local government and community stakeholders from different sectors and interests. This group was assembled to build on the ideas put forward in the earlier focus group meeting and to envision more detailed scenarios through a diversity of perspectives

and expertise. To this end, the four scenario ideas were presented to participants, who discussed them in detail in two concurrent focus group sessions. In these sessions, participants were asked to provide feedback that would refine, add to, discard, reframe, change aspects of, and/or devise alternatives to the scenarios, before returning to plenary to discuss the results. Questions that guided this discussion include:

- *Comment on the suggested scenarios. What could be added to or changed in these scenarios?*
- *What are some other development directions or changes in Squamish that you would like to explore in scenarios?*
- *What might be a desirable 'potential future' (i.e., goal) for Squamish (at the community and/or neighbourhood level)? Please describe what this (or these) might look like.*
- *What are key questions that emerge when exploring a particular scenario?*
- *What are the major planning and development challenges Squamish currently faces?*

The following sections report on the outcomes of the focus groups. We begin by identifying the major themes that emerged from the discussion and describing how these themes present considerations for scenario development. The following *Systems Modelling* section relates a model based on the focus group discussions and themes, and this model illustrates relationships between the different land-uses, strategies and community outcomes. The *Community Development Scenarios* section then describes the new/refined community development scenarios. The document concludes with a section on limitations of and next steps for the research project.

CONSIDERATIONS FOR SCENARIO DEVELOPMENT

Through analysis of the feedback forms, researcher notes and group discussions transcripts, several themes with important implications for scenario development were identified. Noteworthy outcomes from the sessions are as follows:

Squamish is growing – The rapid population growth of Squamish was recognized within the focus groups. One feedback form comment noted the 13.7% population increase that occurred in the community between 2011 and 2016. With this in mind, a 'no growth' scenario was deemed unrealistic, and all scenarios should include population growth. A potential future population of 35,000 was frequently mentioned. One major point of discussion is that all scenarios incorporate growth, but differ in how the population increase will be accommodated.

Development has been planned and approved – Many development projects within Squamish have been approved, and thus new residential units will be available in various parts of the community. These developments should be included within the different scenarios (along with the hypothetical, scenario-dependent residential density) in order to ensure the scenarios

reflect expected housing availability. The Squamish Development Showcase Map was noted to be a useful source of information for this consideration.

Employment spaces are important – Employment spaces and opportunities frequently emerged as a topic of interest. There was discussion around the need for local employment, which can both boast economic development in the community and reduce commuting distances. In addition, types of employment were discussed, and it was expressed that creating variety of jobs (i.e., not just food/beverage and retail) is desirable.

Although employment land can be integrated into mixed-use developments, it was noted that some areas must remain zoned as solely commercial/industrial because residential zoning can make these places unaffordable for businesses. Such a consideration is important for modelling as it indicates that some separation needs to be maintained between commercial and residential areas.

Explore a range of densities – The initial scenario ideas centered on residential density, and although these ideas were refined and (somewhat) shifted in focus, density was still discussed as a key aspect of scenario development. Suggestions were made to explore extremes for residential density, meaning both large, single-family houses to high-density, high-rises. It was also suggested to include a 'missing middle' density form. This consists of a mix of housing types such as a such as bungalow court, duplexes, triplexes and fourplexes, which results in a density that falls between the low- and medium-density forms presented in the initial scenario ideas.

Defining 'levels of density' can present challenges as density means different things to different people. One suggestion for characterizing density was to classify density levels based on other developments in Squamish, such as single-detached houses and townhouse neigbourhoods. Other approaches include deriving density classifications through reviewing relevant literature. It is worth noting that, in some cases, density does not necessarily need to be classified and it can be defined through other variables and considerations (e.g., how much density is needed for neighbourhoods to accommodate a certain percentage of the growing population?).

What is the 'optimal density' – In addition to a range of densities, the idea of 'optimal density' was discussed. This refers to the level of residential density required in community node for local businesses and transit to become viable. For the latter, it was also noted that transit viability can be achieved through developing along corridors rather just in nodes. Optimal density can guide certain scenario development as it can provide neighbourhood population targets that need to be achieved to receive potential community benefits from densification. The ability of neighbourhood visualizations to effectively model viewsheds was highlighted as an aspect of the project that may help define and refine what 'optimal density' means in Squamish specifically.

Create an accessible community – The discussion on density and mixed-used form relates to considerations around access to services and amenities. As noted through the focus group discussions and written feedback, this includes access to green space and schools. For the latter, it is important to consider what the student capacity of schools are in a growing population, in addition to the students' physical access to these places.

Accessibility also relates to questions around walkability and community benefits received from developing compact, walkable communities. A potential benefit that was discussed was increases in community health; however, it was also noted that this outcome is exceptionally hard to model or quantify. Therefore, it likely will be best to explore health benefits through proxies, such as numbers of people engaging in active transportation and reductions in air pollutants resulting from decreased vehicular traffic.

Develop communities with diverse housing types – In addition to density, there was also discussion around the mix of housing within a neighbourhood. It was expressed that developing neighbourhoods with a diversity of housing options (including affordable housing) would allow people to reside within these neighbourhood throughout different stages of their lives and also encourage social diversity. In addition, there was discussion around developing housing with different forms, such as building houses without the large setbacks. These considerations likely will play a minor role in the modelling; however, they feature heavily in the visualization.

Housing affordability is a problem – Affordable housing (or lack thereof) in Squamish was noted to be a significant issue. The modelling and visualization processes will not be able to fully address this issue; however, it could be somewhat examined through considering the mix of housing options available in different scenarios (i.e., does housing consist of just large, single-detached units or are less expensive, smaller units available?).

Developing all land as residential is not necessarily desirable – It was noted that the Loggers East area contains land that could valuable for agriculture, and perhaps it should be reserved for this purpose. Scenarios could involve reserving land for purposes other than residential, such as agriculture or (drawing on the employment spaces theme) commercial/industrial. Such scenarios could involve steep slope development to create more residential without occupying valuable valley floor space. However, as mentioned in the focus group, it is worth recognizing that development on hillsides could have viewshed impacts. This is a scenario where the visualizations will be highly useful and relevant.

Squamish is in a floodplain – Many neighbourhoods in Squamish are located within a floodplain, and this dictates the types of residential units that can be built in these areas. It also creates challenges for building certain types of dwellings, such as tiny homes. Floodplain considerations have strong implications for the types/forms of residential buildings; therefore, they will feature heavily in the visualization process, but less so in the scenario modelling. Avoiding floodplain development by encouraging steep slope development was identified as a potential scenario, and one that may be well-informed through visualizations.

SYSTEM MODELLING

Drawing from the major themes of the discussion, a systems model has been developed. This model will serve as the basis for the scenario modelling and visualization activities.

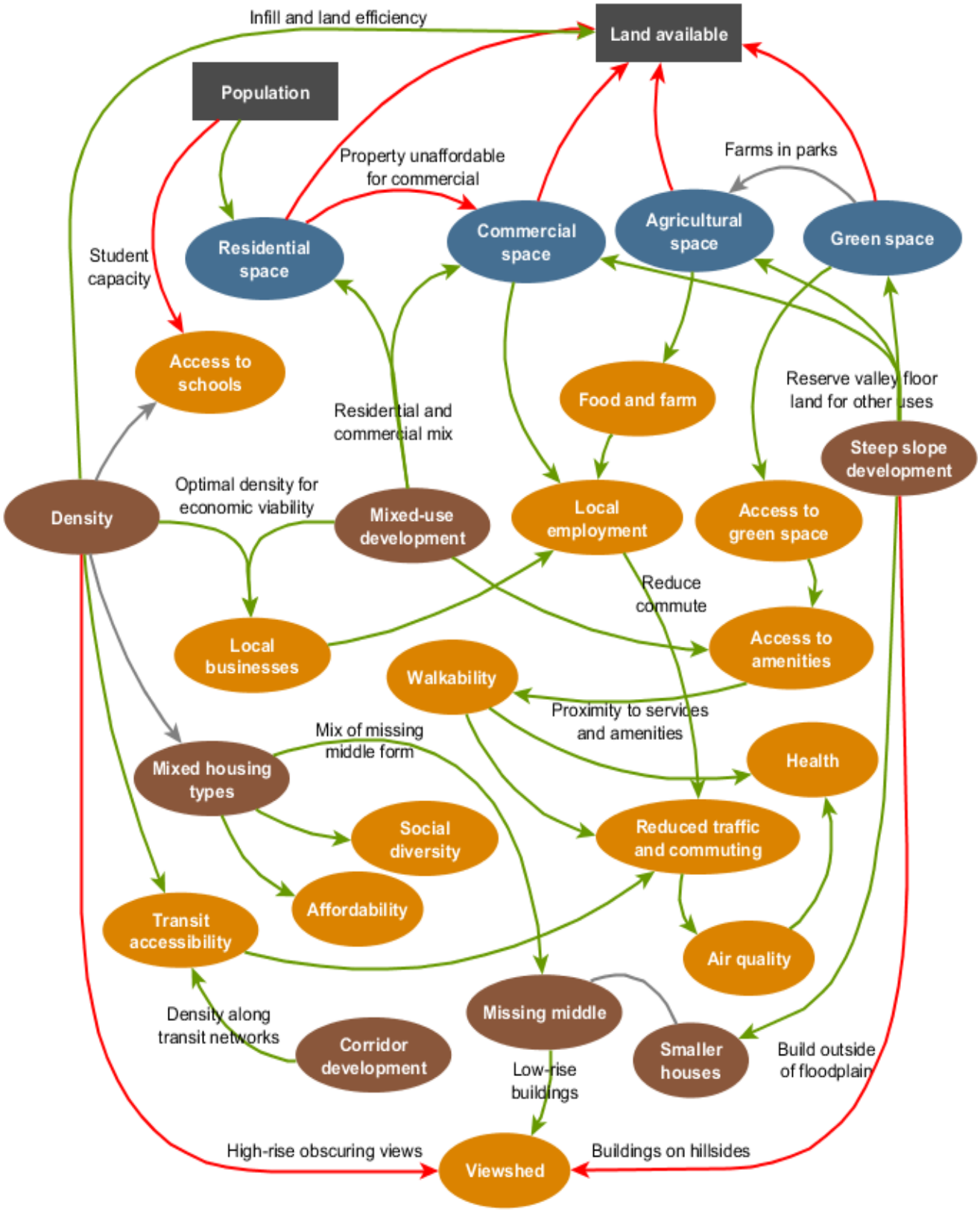
The major elements driving and constraining systems dynamics in the model are population growth and land availability. The latter relates to various competing land uses, and those included in the model were frequently discussed in the focus group, i.e., residential, commercial/industrial, agricultural and green space. The model also features development strategies such as densification, mixed-use development, corridor development, smaller houses (e.g., laneway cottages, tiny homes), missing middle density, mixed housing types, and steep slope development. The strategies have implications for a variety of community outcomes, including access to schools, food and farm systems, local businesses, local employment, access to green spaces, access to community spaces, walkability, health, traffic reduction, air quality, social diversity, affordability, transit accessibility, and viewshed quality.

Reading the Systems Model Diagram

The variables and relationships in the systems model are displayed through the diagram below. Variables are represented through the use of either rectangular or oval nodes. Population growth and available land are represented using rectangular nodes, and types of land uses are represented using blue oval nodes. Strategies are represented with brown nodes, and community outcomes are represented with orange nodes.

Relationships are represented using connecting lines with arrows. Green connecting lines refer to positive relationships between variables (e.g., a strategy or community outcome promoting another community outcome), and red connections refer to negative relationships (e.g., a potential challenge or trade-off). Grey connections are associations that could be positive or negative depending on how a strategy is executed.

Systems model of relationships between population growth, land availability, land use, development strategies, and community outcomes.



Community outcomes can be measured in different ways. The scenario modelling in this research will involve exploring and experimenting with different metrics, and determining what is both feasible (i.e., can be appropriately informed and modelled) and useful (i.e., results in valuable information) for the modelling process. The table below provides potential ways of assessing different community outcomes. It expected that these assessment approaches will change throughout the research process; however, they serve as useful starting points for this investigation.

Community outcome	Potential assessment methods
Walkability	• Estimated numbers of people walking based on distances from residences to commercial, green space and schools • Walkability score based on access and connectivity
Access to green spaces	• Distances from residences to parks and trails • Amount (area) of parks and natural space within a neighbourhood • Park area per person within a neighbourhood
Access to community spaces	• Includes access to green space, but also involves potentially building other community spaces (e.g., plazas) into mixed-use developments
Access to schools	• Distances from residences to schools • School space per number of children
Transit accessibility	• Density and design required to support transit networks • Distances from residences to transit stops (both existing and potential) • Transit time to key destinations (e.g., downtown Squamish) • Estimated public transportation ridership
Traffic reduction	• Estimated change in number of vehicle kilometers travelled (i.e., personal car trips for shopping, recreation and commuting)
Air quality	• Reduction in vehicle emissions based on traffic reduction • Amount (area) of green space within a neighbourhood
Health	• Walkability and air quality variables • Estimated numbers of people doing 30 minutes or more of active transportation on a daily basis
Food and farm systems	• Amount of land reserved for agriculture • Distance from residences to agricultural space (i.e., access to these spaces) • Agricultural productivity
Local businesses	• Amount of space reserved for commercial/industrial • Number of nearby residents that can support local businesses (potentially include density 'thresholds' in the model, i.e., number of local residents needed to make mixed-use community nodes economically viable)
Local employment	• Amount of space reserved for commercial/industrial purposes • Number of potential jobs using estimates on business sizes (this will likely be a highly speculative measure) and employment associated with agriculture (and possibly construction) • Percent of population commuting to Vancouver
Social diversity	• Inferred through the level of diversity in housing types within a neighbourhood
Affordability	• Inferred through using average prices for different housing types and mixes of housing types
Viewshed	• Assessed through visualization activities

COMMUNITY DEVELOPMENT SCENARIOS

A series of scenarios is being developed based on the discussion themes, and each of the scenarios will be examined in the context of systems model. All scenarios assume population growth will continue to occur in Squamish, and it will reach the level frequently mentioned in the focus groups (35,000 people). The time frame for this growth is 20 years, as this is a viable planning horizon and it also resembles a medium growth projection for the District of Squamish.[1]

As previously mentioned, many development projects within Squamish have been approved and these should be included within the model. Scenarios can reflect approved development activities (assuming a reasonable pace of construction) then examine how to distribute the remainder of the population growth throughout the community. This involves looking at different levels and types of development in various neighbourhoods in Squamish. Key neighbourhoods for this modelling include Garibaldi Estates, Loggers East, and Dentville. The Garibaldi Highlands was also considered a potential neighbourhood for exploring different densities and development types; however, opinions around modelling this area varied, and for the purposes of maintaining the scope of analysis, it will likely not feature as heavily in the scenario modelling.

The descriptions of the scenarios below are primarily qualitative, and many of the details regarding specific figures (e.g., people per hectare, percentages of mixed-use space reserved for commercial) will emerge through data gathering and the research process. Time permitting, modelling might include combined scenarios, meaning some neighbourhoods could follow one type of scenario whereas other neighbourhoods could follow a different scenario.

Five scenarios are proposed for this research, and these are as follows:

1. Single detached family housing neighbourhoods – This scenario explores the 'low density extreme' in neighbourhoods outside of the downtown area. The scenario assumes that all development beyond that already planned will be single detached family housing. It will explore potential housing deficiencies this development approach could lead to, as well as the implications around housing diversity (or lack thereof) and prices. Land use in the neighbourhoods will be reserved entirely for residential and will not involve mixed-use development.

[1] The *District of Squamish OCP Update. Phase 3: Community engagement summary* report (https://squamish.ca/assets/OCP-Review/Phase-3-Engagement-Summary-FINAL-with-ADDENDA-Sep7.pdf) provides a medium growth scenario where an estimated population of 34,000 will be reached by 2036.

2. Missing middle development and mixed housing options – This scenario explores neighbourhood development that contains a mix of housing types such as bungalow court, duplexes, triplexes and fourplexes. Missing middle densities can reach up to 40 dwelling units per acre[2], and some space can be reserved for parks and a retail. The scenario can involve some development and infill along transit corridors to increase transit viability.

3. Medium density townhouses in community nodes – This scenario involves the development of townhouses and mid-rise buildings in nodes and corridors. Modelling this scenario can be approached in two ways. One way involves accommodating the same level of population as found in Scenario 2, but leaving more space for commercial, parks, community spaces and public gardens[3]. Another approach would be to model the development of a neighbourhood with a target population in mind, with this target centered on the viability of local businesses and transit. The initial modelling will take the former approach, and depending on time and feasibility, the latter will be explored.

4. Medium density and hillside development – This scenario involves medium density development along corridors and in some neighbourhoods, while also developing on hillsides to reserve valley space for other uses. In particular, land in Loggers East will be modelled as reserved for either agricultural or commercial/industrial (each purpose can be modelled as a 'sub-scenario'). The modelling of hillside residential areas will be loosely based on the developments in Crumpit Woods, and due to anticipated space and terrain limitations, these areas will contain little (or no) retail and will predominantly accommodate single family units.

5. Development nodes – This scenario investigates potential outcomes of housing all population growth within neighbourhoods outside of the downtown area (after accounting for planned/approved developments). In this sense, it could be considered to be the 'opposite extreme' from Scenario 1. The scenario will involve mixed-use development, and it will provide insight on how densification of nodes and corridors can potentially lead to outcomes such as increases in potential customers for business and residential proximity to potential work places. Some area will be allotted for green space, and the height of residential buildings will be influenced by this allotment (i.e., with spatial constraints, more storeys are need to house more people).

[2] Parolek, D. (2015). How does the missing middle housing fit within communities? Envision Fredrick County. https://envisionfrederickcounty.org/how-does-the-missing-middle-housing-fit-within-communities/

[3] The scenario could involve allocating some park space for agricultural purposes, such as done with Loutet Farms in North Vancouver (http://ediblegardenproject.com/loutet-farm/)

CONCLUSIONS AND NEXT STEPS

This aim of this report is to identify main themes from the focus group discussions and then develop a systems model and scenarios that reflect these themes. To this end, the systems model and scenarios attempt to comprehensively capture the themes; however, it is important to recognize that due to anticipated time and data limitations, it is likely that not all aspects of the scenarios will be modelled. Therefore, although the model/scenarios will guide the research, ultimately some of what is described above will not be explored.

It is also worth noting that some of the themes and scenario outcomes are better explored through visualization, and thus they are not relevant to the modelling stage of this project. For example, the visualization can be used to examine the look and 'feel' of different types of housing in neighbourhoods and impacts of development to the local viewshed. Therefore, although considerations like housing diversity and views of the landscape are referred to in this document, they will be revisited in the next focus group session, when we discuss how to proceed with the visualization of the scenarios.

Modelling will occur over the summer and the next focus group session will likely be held sometime in September. After discussing the outcomes of the modelling exercise, we will then determine what location might be best for scenario visualization. The visualization development will occur throughout the fall, and the final focus group session will likely take place in early 2019. During the final session, we will discuss potential options for engaging the broader public with the visualization.