JUNEAU COMMISSION ON SUSTAINABILITY CLIMATE IMPACTS/ SUSTAINABILITY INDICATORS SUBCOMMITTEE AGENDA

September 26, 2023 at 12:00 PM

Zoom Webinar

https://juneau.zoom.us/j/88069534778 or 1-253-215-8782 Meeting ID: 880 6953 4778

-

A. CALL TO ORDER

B. LAND ACKNOWLEDGEMENT

C. ROLL CALL

D. PUBLIC PARTICIPATION

E. APPROVAL OF AGENDA

F. APPROVAL OF MINUTES

1. N/A

G. AGENDA TOPICS

2. Background material on Sustainability Award & Indicators
3. Discussion for next steps on Awards
4. Discuss an approach for developing a first draft for indicators

H. INFORMATION ITEMS

5. Project Proposal Task List
6. Memo to HRC - Award for Excellence in Sustainability
7. Award for Excellence in Sustainability Final Draft
8. Juneau Draft Sustainability Indicators 2005
9. Juneau Sustainability Indicators PowerPoint
10. CBJ Comprehensive Plan 2013
11. 2011 Indicators to Assembly Draft
12. APA Direction and WH Phases
13. Sustaining Sustainability Whitehorse (Urban Sustainability in the Arctic)

I. COMMITTEE MEMBER / LIAISON COMMENTS AND QUESTIONS

J. NEXT MEETING DATE

14. TBD

K. ADJOURNMENT

ADA accommodations available upon request: Please contact the Clerk's office 36 hours prior to any meeting so arrangements can be made for closed captioning or sign language interpreter services depending on the meeting format. The Clerk's office telephone number is 586-5278, TDD 586-5351, e-mail: city.clerk@juneau.org.

Sustainability Awards Draft Task List **updated May 30, 2023 /Revised August 8, 2023**

For each of the tasks below, the question is: who should do this? All involve either extensive discussion or labor and review, and it will be important to know which will be JCOS time and which will be CBJ internal work, as well as what CBJ work will and will not be subject to CBJ or Assembly overview. Are there any other civic, non-profit, or private partners who could or should be involved in the process?

First-year launch tasks:

This work does not need to be repeated.

Tasks	**JCOS**	**CBJ - Human Resources**	**CBJ COW**	**CBJ Assembly**	**CBJ Depart**	**Other**
A. **Draft Concept Paper** (Award for Excellence in Sustainability) Purpose, Areas, Process, Criteria, Eligibility, Guidelines, Application.	Draft Completed (8-26-20)					
B. **Draft List** of details for consideration and approval 1. Suggest final name of awards 2. Establish CBJ policy for standards for giving awards and which department or office is responsible (such as Mayor's office, Assembly, or Public Works) 3. Suggest frequency and number of awards ~~4.~~ Suggest which part of the selection process that are confidential and public, and storage for JCOS and CBJ. ~~which parts of the awards process and documentation are necessarily public, which should be securely stored~~ 5. Consider inviting community or stakeholder input to increase buy-in (optional). 6. Suggest process for solicitation and review (including defining JCOS' role, CBJ's role, other partners' roles, managing conflicts of interest) 7. Suggest deadline, duration of nomination period, and announcement date 8. Draft language for nomination questions and criteria 9. Draft platform / format for nomination submissions and uploads 10. Finalize language of the award itself 11. Articulate Branding and design desires as a client	All these items need to be drafted by JCOS, Outreach Comm. & full JCOS	Review	Review	Finalize	?	

	JCOS	Human Resources	CBJ COW	CBJ Assembly	CBJ Department	
C. Public Outreach. Tasks depend on how elaborate the program becomes.	X (JCOS) can help with this item.	Reviews draft	Reviews final Draft	Reviews and Approves		
Branding for the awards – ideally to last many years	X				Public Info.	
Logo & colors	X					
Photos cleared for use	X					
Print and web material templates / examples	X					
Website or web pages at CBJ						
• for applicants						
• FAQ's/details on process	X					
• page featuring winners						
• archive for previous years' winners						
• Video assets/trailer						
Certificate design and language						
Create social media presence or policy	X					
Promotional materials to solicit nominations/applications	X					
Promotional materials for winners' announcement or announcement event	X					

Tasks	JCOS	CBJ - HR	CBJ COW	CBJ Assembly	CBJ Depart	Other
D. Create internal administrative infrastructure						
• Any necessary new email addresses or profiles						
• CBJ documentation and organizational systems						
• Contact lists for communications and promotion	X					
• Document and contacts security, where relevant						
• Potentially build form for/reformat/store nomination submissions						
• Document internal review forms/standards for nominees						
Create the first committee/subcommittee to review applications	X	X				
• Draft Develop internal process and guidelines for documentation, turnover	X					
• Draft first versions of working documents	X					
Track and document entire process for review and revisions after year one	X					

Recurring tasks: *This work would be repeated for every Sustainability awards.*	JCOS	**CBJ -** Human Resources	**CBJ** COW	**CBJ** Assembly	**CBJ** Depart	Other
Confirm dates and deadlines for awards with all relevant stakeholders						
Update process and workflow to reflect evolving Sustainability Awards stakeholder priorities						
Design/acquire new media assets for the current year						
Solicit sponsors or supporting organizations (optional)						
Website updates and social media campaign						
• **Before nomination period opens**						
• **When nomination period opens**						
• **When nomination period closes**						
• **After winners are announced**						
Coordinate or coordinate with any events relating to announcement of winners						
Respond to community input or requests for assistance with the awards and awards process (correspondence)						
Convene new committee/subcommittee to review applications						

• **Set internal meeting schedule**						
• **Deliberate and review applicants**						
• **Develop final report**						
Choose awardees						
Create certificates						
Announce awardees						
Ensure certificates and any other awardee benefits are confirmed delivered into the right hands						
Track, store, and organize both public and secure documents relating to Awards						
Verify that all post-awards business and correspondence are concluded						
Evaluate process and propose changes for the following year						
Solicit feedback from awardees and community to document any impact the Awards may have on sustainability						

- Confirm dates and deadlines for awards with all relevant stakeholders

CITY AND BOROUGH OF JUNEAU
ALASKA'S CAPITAL CITY
COMMUNITY DEVELOPMENT

Juneau Commission on Sustainability
(907) 586-0715
CDD_Admin@juneau.org
www.juneau.org/sustainability
155 S. Seward Street • Juneau, AK 99801

To: Wade Bryson, Chair
Assembly Human Resources Committee

From: Gretchen Keiser, Chair
Juneau Commission on Sustainability

Date: August 25, 2020

Subject: Award for Excellence in Sustainability Proposal

As you may recall, former JCOS Chair Mitchell and I presented a draft of this "Sustainability Award" proposal to the Assembly's Human Resources Committee earlier this year (pre-Covid) on February 3, 2020. The concept is fairly straightforward: CBJ would recognize and celebrate Juneau individuals, businesses, agencies or organizations for their outstanding projects, actions, or efforts that make Juneau a more sustainable community. Annual sustainability awards are a way that municipalities not only build community support for tackling its economic, social, and environmental challenges but also help to transfer the useful knowledge gained by an awardee to others in the community for future actions.

In February, the HRC asked us to revise the proposal to more fully explain the possible areas of sustainability achievement and to have JCOS doing the legwork on the application and initial selection process and bring forth award candidates to the HRC for its consideration. Attached is JCOS' revised proposal.

If the Assembly decides to move forward on this idea, JCOS is ready to implement this sustainability award effort.

Attachment: *Award for Excellence in Sustainability*

Final Draft (8-26-20)
City and Borough of Juneau
Award for Excellence in Sustainability

Purpose: The Award for Excellence in Sustainability (AES) is an annual award that recognizes and celebrates outstanding community projects, plans, policies, individuals, government agencies, and organizations dedicated to supporting Juneau as a sustainable community.

In keeping with the sustainability concept, one or more awards may be given in the following areas (1 - 9) below.

Sustainability Achievement Areas

1. **Resilient Economy** – Projects that help grow a strong, local economy and provide opportunities for households to improve their quality of life through education and employment.
2. **Climate Change and Adaptation –** Projects that reduce greenhouse gases or adapt to the impacts from climate change.
3. **Energy and Built Environment –** Projects that conserve energy and promote renewable energy or use building design to enhance the environment.
4. **Public Policy / Institutional** – Projects or processes that increase energy efficiency and are innovative in one or several of the Sustainability Achievement Areas (1 -3, 5-7).
5. **Natural Systems –** Projects that support Juneau's healthy ecosystems.
6. **Sustainable Transportation –** Projects that encourage multimodal travel options – walking, biking, carpooling, transit combined with safer streets.
7. **Waste Reduction-** Projects that reduce waste by thoughtful procurement of materials and keep materials out of Juneau's landfill through reuse, composting and recycling.
8. **Food Security** - Projects that increase local food production through innovation, accessibility, and marketing.
9. **Public and Community Health** – Projects that support community building and personal connections.

Selection and Award Process

A Selection Committee consisting of five members of the Sustainability Commission review applications using the criteria below and will then make recommendations to the City and Borough of Juneau Assembly's Human Resources Committee (HRC). The HRC will review and make a decision on candidate/s to forward to the full Assembly.

Awards would be announced by the Assembly at a convenient location and event such as an Assembly Meeting or public event such as the JEDC Annual Innovations Conference or an Earth Day celebration.

Award Criteria

The Selection Committee will use the nine achievement areas outlined above and the relevance of each project or process to contemporary challenges facing the local, regional, state, and global community. Of particular importance is education or knowledge transfer, responsiveness to climate change, inclusive use of technology, and the challenges that were addressed or overcome. The project should also show how the individual, business, agency or group took action to move sustainability forward.

Eligibility and Guidelines

1. The AES is open to any individual or collaborative applications from Juneau resident, or entity (corporations, non-profits, government agency, organizations, etc.).

2. Applicants can nominate themselves, or by a third party.

3. Nominations should describe the project or initiative in progress or completed in _____ [include the year]

4. Individual students, school groups or clubs, and community youth groups may nominate themselves and must have a sponsor 18 years or older.

Application

An electronic application is required to be submitted to the CBJ City Clerk's Office. The application would include a one- or two-page description with attachments if applicable. Awards would be announced by the Assembly at a convenient location and event such as an Assembly Meeting or public event such as the JEDC Annual Innovations Conference or Earth Day celebration.

Appendix 8. Juneau Draft Sustainability Indicators – Framed as Five Domains

Social and Cultural	• Capacity of pre-school & classroom size • Adult literacy rate • Dropout rate, by ethnicity • Average college entrance scores • Number attending college • Percent population in cultural arts • Homeless housing and support • Child care availability & costs • **Emergency services response time** • Access to health care • Percent of healthy births & child immunizations • Incidents of crime by type • Number of charitable organizations, volunteer hours, and annual budgets
Environmental	• **Relative sea rise and affected public and private structures** • Noise levels • **Safe water and air quality – number of violations (air and water)** • Scenic corridors for water & mountains • Scenic corridors to harbors, historic landmarks • **Amount & location of developed coastline** • **Number of fish and wildlife species** • **Number of dirty water bodies** • Water quality – fresh and marine • Number of food conditioned bear kills • Number of acres of altered vegetation, streams, & structures w/in habitat • Number & miles of publicly accessible trails • **Number & acreage of shoreline parks & accessible boat launch facilities**
Economic	• Housing for all – vacancy rate by price • Living wage – estimated household budget • Percent households without medical benefits • Percent of households paying more than 50% of gross income on shelter costs • Job longevity • City revenue and operating expenses • Per capita cost of public services • Per capita debt ratio • **Retain Alaska State Capital in Juneau** • Employment opportunity & diversity • Private sector capital availability • **Percent of goods produced locally** • Price of nonrenewable fuels • Academic programs matched to job market
Public Policy-Related	• **Number of public gathering places downtown and neighborhoods** • Number of neighborhood associations and civic groups • Percent of population that use public transit • Streets with formal bike lanes • Amount of solid waste land filled, reused and recycled material • Police and firefighters per 1,000 population • Staff per acre of parks & rec. facilities • Average density of developed & vacant land within ¼ mile of bus service
Technological	• **Percent of alternative energy consumption (other than liquid fuels)** • *Research, application, and education in alternative energy consumption*

	• *Education – alternative energy, conservation, longer term planning, building tech*.

Juneau Sustainability Indicators

Program

1. CBJ Direction and draft list.
2. Examples and trends from other cities
3. What might work here and process.
4. Questions and Answers.

CBJ Direction

- It is the policy of the CBJ to develop and use sustainability indicators to measure Juneau's Progress toward becoming a more sustainable community.

Standard Operating Procedure

2.3.SOP1 Measure CBJ capital improvements, projects, ordinances, and purchases against adopted sustainability indicators to ensure that the CBJ is moving toward a sustainable future.

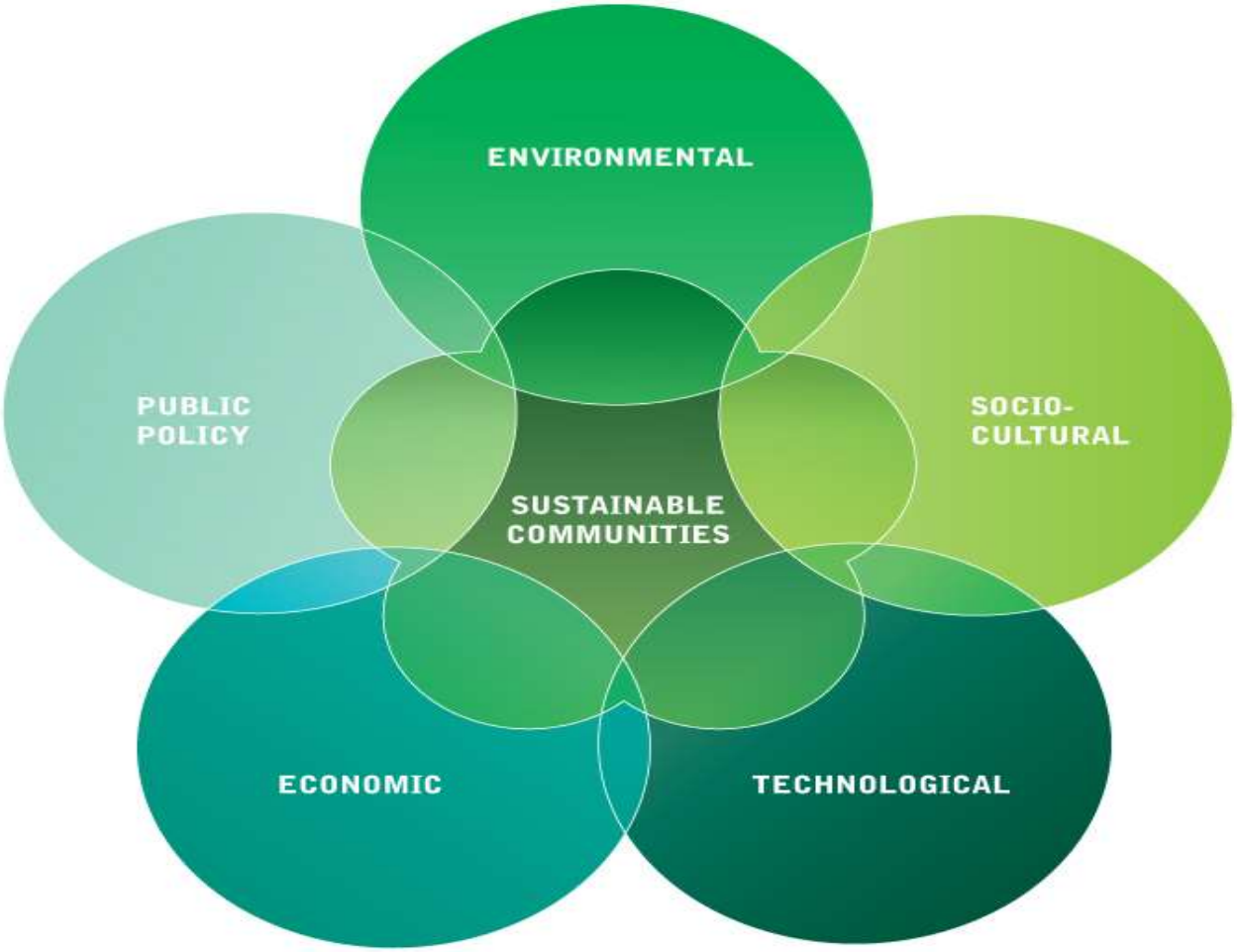
- **Implementing Actions**
- 2.3.IA1 Support the CBJ Commission on Sustainability in completing its mission and tasks to
  - (A) provide ongoing development of sustainability indicators and measures;
  - (B) periodically review the indicators and measures to confirm their currency and relevance and to track the CBJ's trends; and
  - (C) incorporate the adopted sustainability indicators into the process of scoping, funding, and carrying out all proposed CBJ Capital Improvements including buildings, facilities, equipment, and components.
-

- Periodically assess whether adopted sustainability indicators are measuring sustainability as intended, and amend them as necessary to improve their utility.

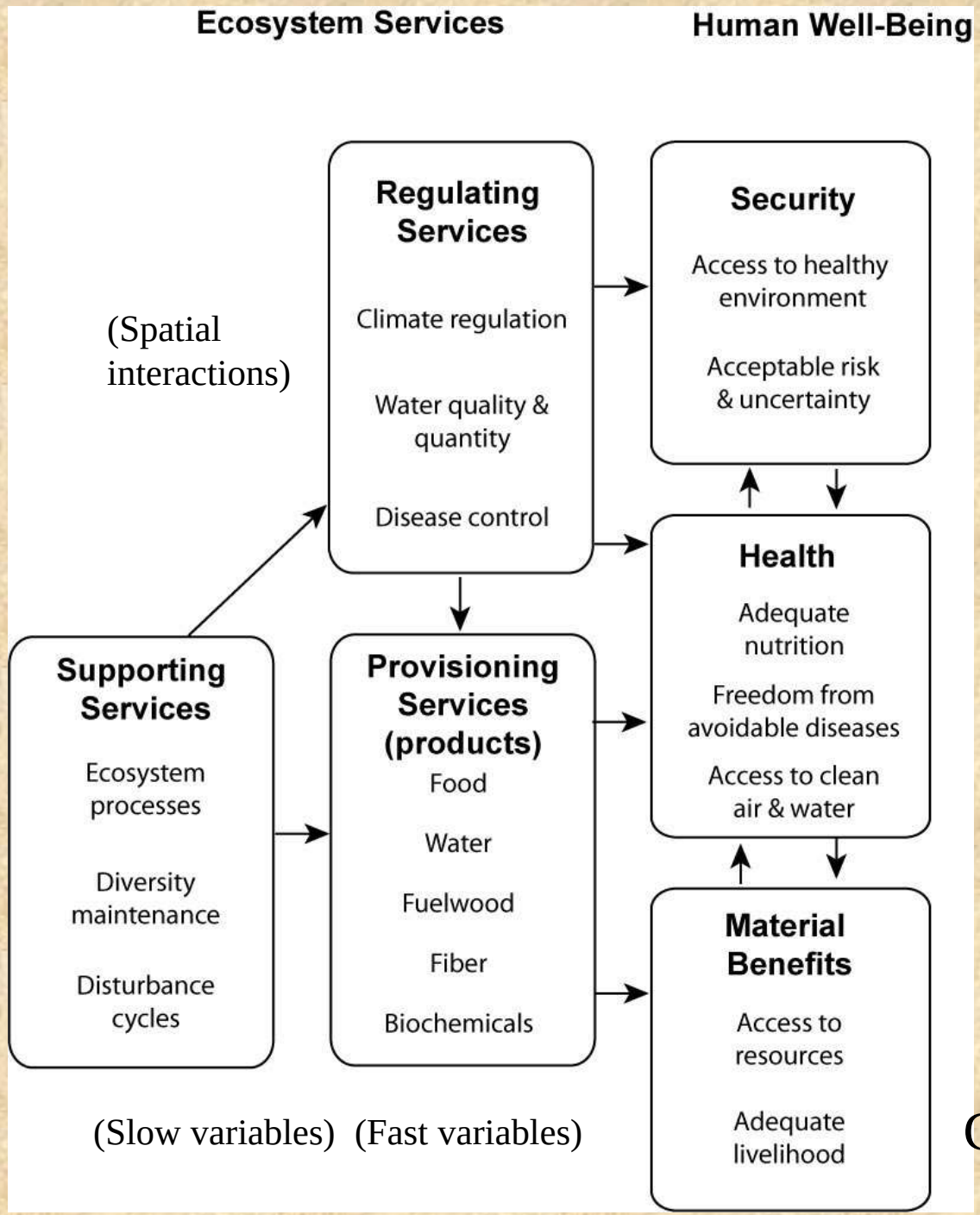
Framework assumptions

- CBJ silent on emphasis (economic over environment)
- Might want to consider reviewing
  - United Way
  - Other Social indicators.
  - Slow and fast moving indicators
  - Relationship or indicators for Climate Change

EcoSTEP
THE FIVE DOMAINS OF SUSTAINABILITY



Example: Framework



(Spatial interactions)

(Long-term security)

(Fast response)

(Fast response)

(Slow variables) (Fast variables)

Chapin et al

Sustainability

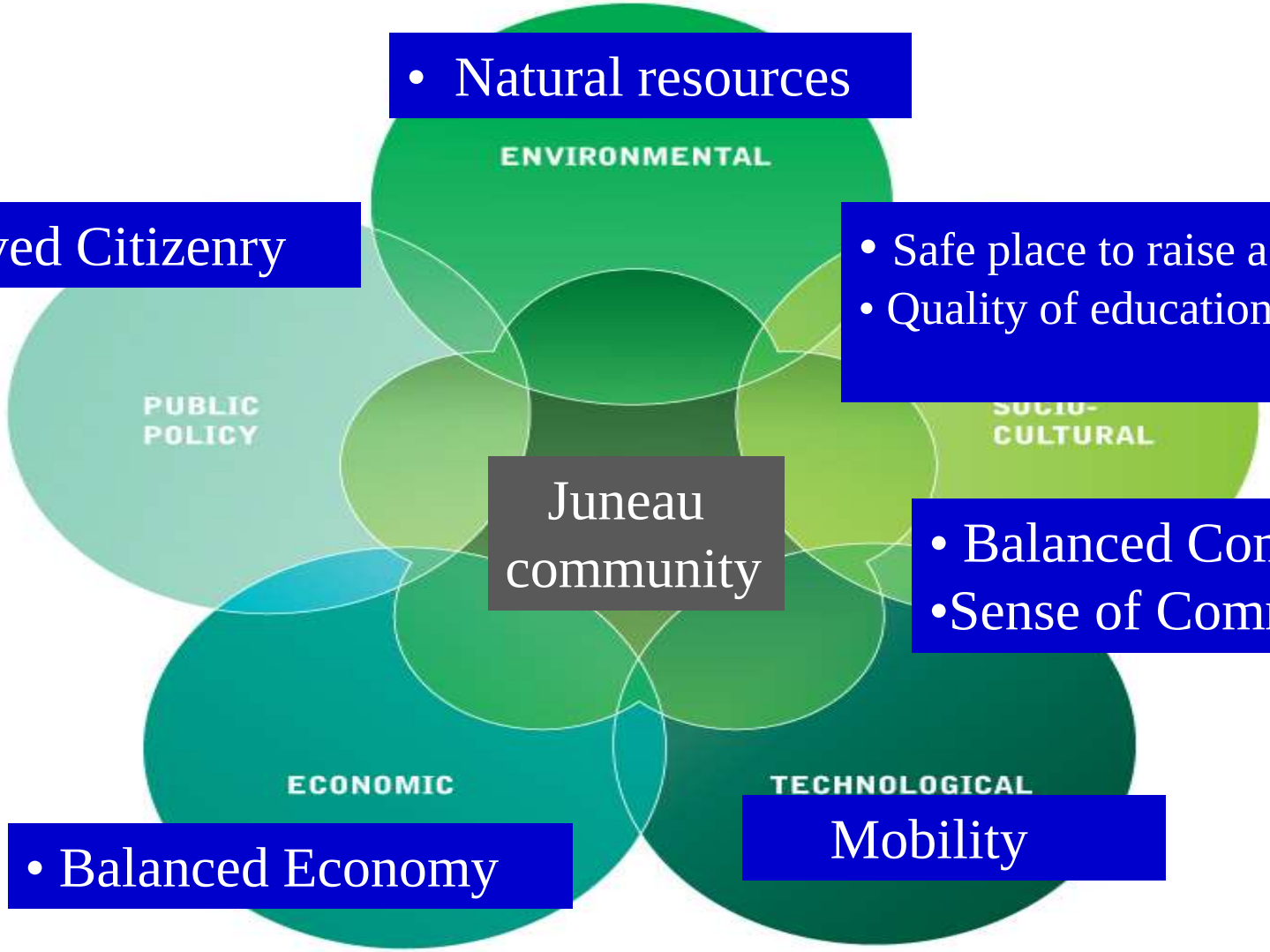
- At least three characteristics:

  Integrative

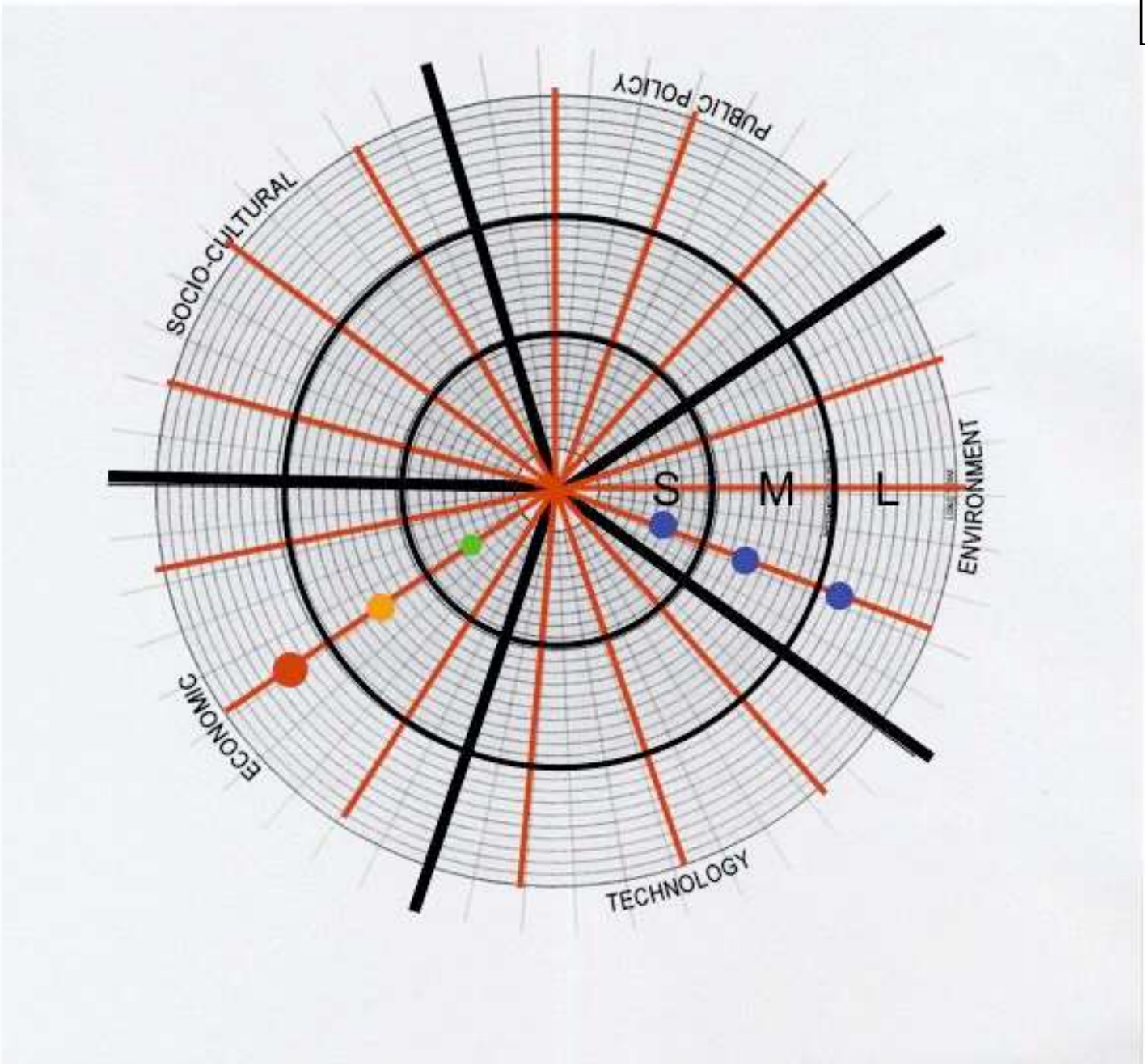
  Participatory

  Long – Term

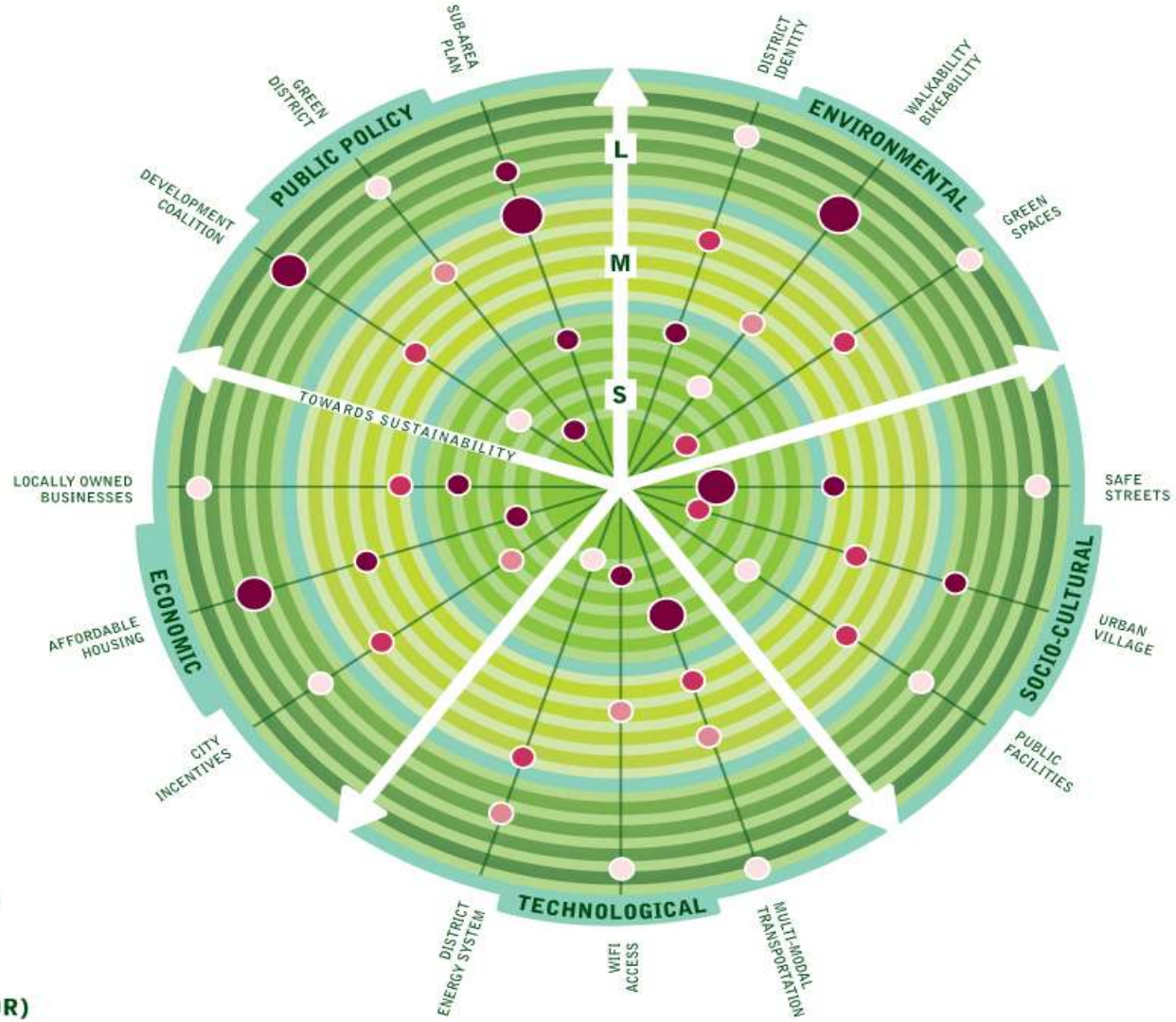
CBJ- Community Values 20



- Natural resources
- Involved Citizenry
- Safe place to raise a family
- Quality of education
- Balanced Community
- Sense of Community
- Balanced Economy
- Mobility


PUBLIC POLICY
ENVIRONMENT
TECHNOLOGY
ECONOMIC
SOCIO-CULTURAL
S
M
L

EcoSTEP
MEASURING SUSTAINABILITY



PRIORITY (SIZE)
- NORMAL
- URGENT

SEVERITY (COLOR)
- IMPROVING
- CAUTION. KEEP WATCH
- REQUIRES ACTION
- DANGEROUS

L LONG-
M MID-TERM
S SHORT-TERM

Systems Theory

- Slow and fast moving variables
- (public focus on fast)
  - Ecological - s
  - Man made - f
  - Wealth, infrastructure, cultural ties –s

Complex adaptive Systems – learning and legacies. – humans decisions depend on past events for future (reflexive behavior)

Know Basic Assumptions

The basic human needs

according to
Manfred Max-Neef

200 Cities Web based Survey

NRDCs Smarter Cities

Category	Total #	%	sample size
Large	67	0.34	20
Medium	176	0.33	53
Small	402	0.32	127
	645	1.00	N=200

Proportional Stratified Random Sample:
(Generated using Uniform random numbers)

- Other cities: (38, lg, med, and Sm

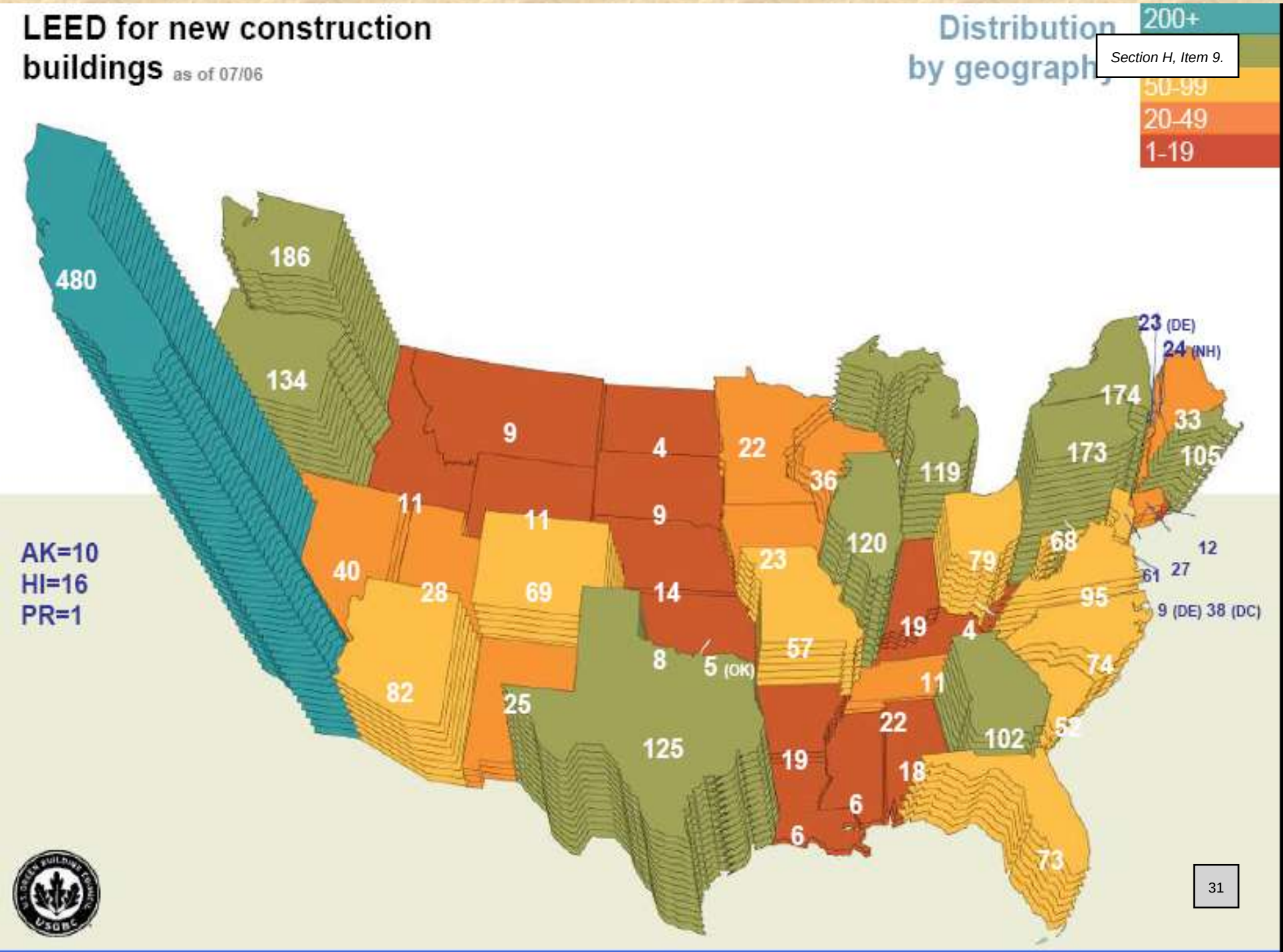
- Importance - over 50%
- Public Workshop 57% - gov't
- Barriers 100%
  - Fiscal 71%
- Data Sources 100% local
  - State 57%, national 42%,
  - International 14%
- Updating SIs 50% > Annual
  - 33% once every 4-2 years,

Survey Results

Cities with SIs	7
In process of developing SI	6
Policies but no measurements	3
Different terminology	1

LEED for new construction buildings as of 07/06

Distribution by geography



Survey Results

- One Main office 71% no

- Useful in City Govt 100%
  - Land use plan. – 88% (very import)
  - Environ. - 88%
  - Trans, - 70%
  - Parks & Rec - 70%
  - Health - 88% Moderately
  - Budget - 50 % Moderately

Survey Results

- One Main office 71% no

- Useful in City Govt 100%
  - Land use plan. – 88% (very import)
  - Environ. - 88%
  - Trans, - 70%
  - Parks & Rec - 70%
  - Health - 88% Moderately
  - Budget - 50 % Moderately

Survey Results

- Importance to Private Sector

  Mod – 44%, Import – 50 %, V.Imp 17

  Public Participation

  Very important 44%, Important 29%

  Communications

  Internet/social Network – 75%

  report to public - 50%

  Budget Doc - 62%

SI Development in United States	Large cites 250K - >	Medium cities 199-249k	Small cities 50-199K	Total
No Sustainability Indicators, goals, or program	6	33	95	134
Disaggregated/ Indicators /not	6	9	9	24
Aggregated – SIs but not used	6	7	11	24
Aggregated – SIs Operational	0	4	10	14
Aligned Operational & Monitored	3	1	0	4
Total	21	54	125	200

Key communty Sustainability Issues

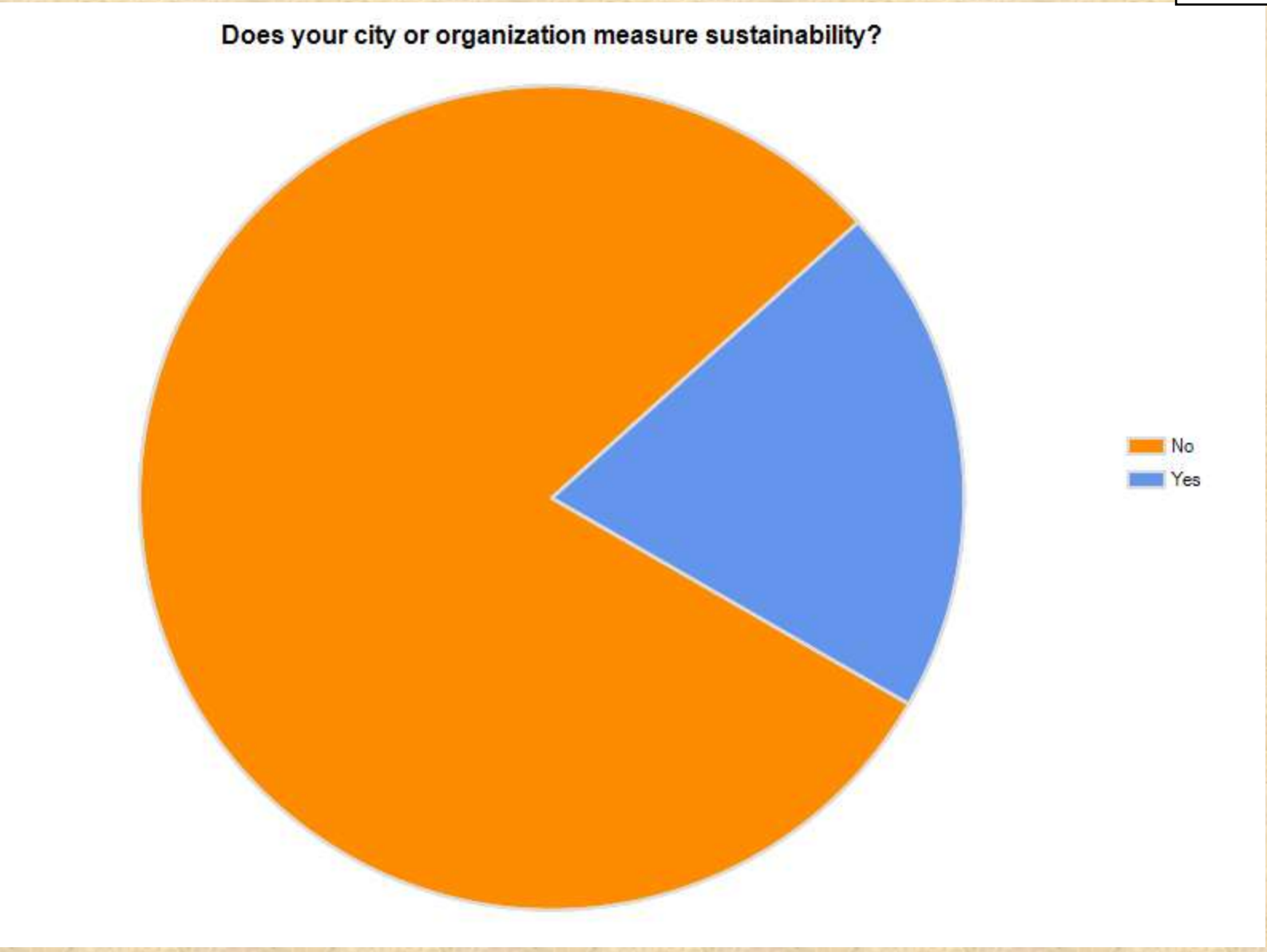
Issue	Count	Issue	Count
Transportation	6	Open Space	2
Land Use	6	Energy Generation	1
Green House Gases	5	Funding Sustainable Development	1
Jobs	5	Environment	1
Lack of approach to Sustainable Development	5	Social Equity	1
Affordable Housing	4	Food Security	1
Water quality/quantity	3	Sea Level Rise	1
Retaining Historic Bldg	2		
Green building	2		

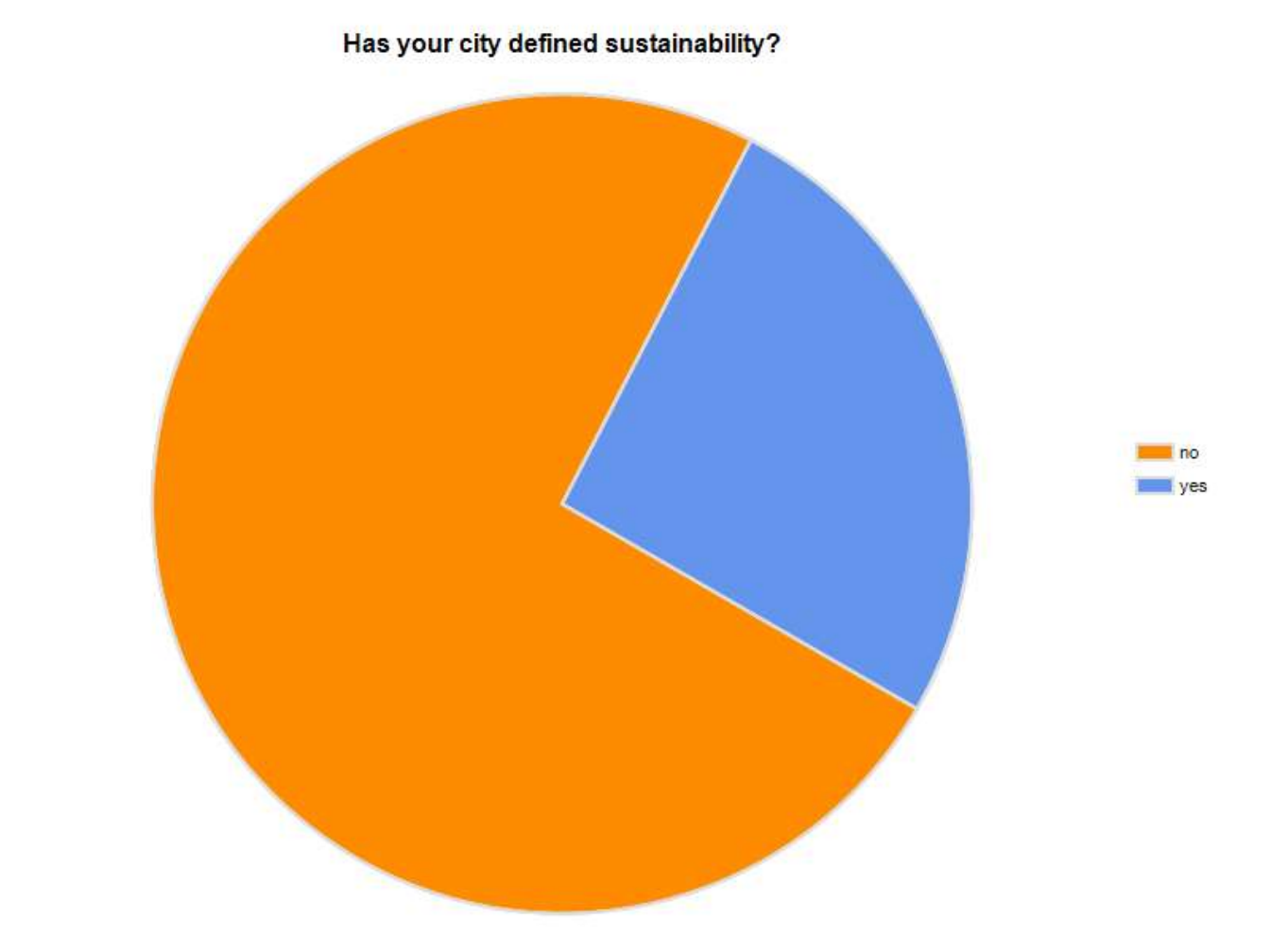
Outstanding examples

- **Oakland** - Alignment matrix – goals to measure across sustainability domains
- **Albuquerque** - Software aligning goals, measures, data, & public comment
- **Denver** - Stated policy that economy is subsystem of environment
- **Austin -** Sustainability matrix for CIP projects (Austin)
- **Austin** - Carbon Neutral by 2020

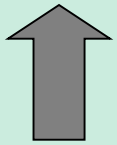
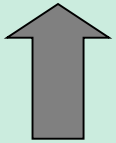
Tale of three cities

- Jacksonville, Florida
  - NGO, began in 1985, pre UNCED
  - Quality of life indicators, evidence of use
- Santa Monica, California
  - Core Principle, 8 guiding principles for gov.
  - Self evaluation – city did piece meal approach
- Sustainable Seattle
  - More famous outside then in,
  - 1993 first SIs, not used, maybe soon


Does your city or organization measure sustainability?
No
Yes


Has your city defined sustainability?
no
yes

Summary of Primary Climate Change Projection

Major	Direction	Description
Air temperature		• Increase approximately 10°F by end of current century. • Temp. increased as much as 3.6°F during the 20th century. • Largest increase occurring during the winter months. • Rates of warming were higher in the later part of the 20th century, and Juneau's average wintertime temp. rose by 1.5-3°F in the past 60 years.
Vegetation		Shrubs and trees will have colonized elevations currently characterized as alpine or tundra habitat
Precipitation		• Average winter snowfall at sea level in Juneau decreased from 109 inches to 93 inches in the past 60 years. • The average winter precipitation including rain and snow (reported as inches of liquid water), increased by 2.6 inches or more
Sea level Rise		• Isostatic rebound is likely to cancel relative sea level rise
Icefield		Icefield will continue to retreat
Ecological Response		· Many changes not be predictable and some may be counterintuitive. Ex: yellow cedar trees are freezing in spring as temp. warms due to a loss of insulating snow cover. • Effects on salmon largely unknown • Wetland nursery areas for marine species • Plants & animals ability to adapt w/ rapid changes

Process

- Visioning (NGO, City, Chamber)
- Organization/ Mission/Objectives
- Framework
- Develop and Publication of Indicators
- Public Review and Revisions

COMPREHENSIVE PLAN of the CITY & BOROUGH OF JUNEAU

ADOPTED NOVEMBER 2013
ORDINANCE 2013-26

CITY/BOROUGH OF JUNEAU
ALASKA'S CAPITAL CITY

ACKNOWLEDGEMENTS

City and Borough of Juneau

Kim Kiefer, City Manager
Rob Steedle, Deputy City Manager

Assembly Members

Merrill Sanford, Mayor 2013
Mary Becker
Karen Crane
Johan Dybdahl
Loren Jones
Jesse Kiehl
Jerry Nankervis
Carlton Smith
Randy Wanamaker

Planning Commission

Michael Satre, Chair
Dennis Watson, Vice-Chair
Dan Miller, Clerk
Nicole Grewe, Vice-Clerk
Marsha Bennett
Nathan Bishop
Ben Haight
Karen Lawfer
Jerry Medina

Past Assembly Members include: Bruce Botelho, Mayor 2012, Ruth Danner & David Stone

Many groups and individuals contributed to this update of Juneau's Comprehensive Plan. The Assembly and Planning Commission would like to acknowledge the valuable assistance of the following groups:

Affordable Housing Commission
Alaska Electric Light & Power Company
Commission on Sustainability
Central Council Tlingit Haida Indian Tribes of Alaska
Douglas Island Indian Association
Juneau Chamber of Commerce
Juneau Economic Development Council
Juneau Hydropower
State of Alaska Department of Transportation & Public Facilities
All of Juneau's Neighborhood Organizations
and many more

Special thanks to Pat McGonegal for graciously donating the cover photos, and to Glen Fairchild for designing and creating the Comprehensive Plan cover.

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CHAPTER 1
INTRODUCTION AND BACKGROUND

Situated between the sea and steep glacial peaks, the City and Borough of Juneau (CBJ), Alaska's Capital City, is known and appreciated internationally for its awe-inspiring natural beauty. It is no wonder that our city draws approximately one million visitors each year from around the world.

Juneauites feel very lucky to live here. We value the scenic beauty of the surrounding terrain, its lush vegetation and clean waterways, and the abundant fish and wildlife supported by the coastal rainforest. We appreciate the easy access to wooded trails and fishing grounds, and year-round recreational opportunities. We value the small town feel of our city and the unique ways in which we have been able to incorporate big city amenities, such as diverse artistic, theatrical, musical, culinary, and other cultural pastimes, into our small Capital City. We live in safe neighborhoods and go about our day-to-day business within a friendly and functional community. We value a quality education and lifelong learning.

In order to protect and enhance the livability of Juneau, most agree that it is important to safeguard the environment, provide affordable housing and jobs for generations of residents, promote orderliness in growth, and institute reasonable and consistent controls over land development and public services. The *Comprehensive Plan* (also referred to as the "*Plan*" and the "*Comp Plan*") is a long-range blueprint designed to guide the growth, development, and conservation of valued resources within our community over the next 20 years, to the year 2033. It is a collaborative document, incorporating input from diverse sectors of the community with the support of, and coordination by, CBJ staff. The *Plan* embodies both a long term vision of where we are going as well as concrete policies and actions to get us there. It is used to guide CBJ staff, elected officials and their appointed Boards and Commissions in shaping a better community through allocation of resources in ways that reflect the community's aspirations, values, and needs.

Through the process of comprehensive planning, a community can:

1. preserve, promote, protect, and improve the public health, safety, appearance, convenience, provision of services, and general welfare;

2. prevent overcrowding of land and exceeding the "carrying capacity," or adequate level of service, of the land and infrastructure, such as roads, water and sanitary sewage services; and,

3. conserve, develop, utilize, and protect natural resources within its jurisdiction.

To be a meaningful and effective document, the *Comprehensive Plan* must be considered regularly and used by residents, the Planning Commission, and the assembly to guide its' decisions and resource allocations and it must be kept current to reflect community values, resources, constraints and opportunities. Discussions related to community growth, redevelopment, capital and social improvements, or budget, must occur in consultation with the *Plan*. This is not to say that the *Plan* will be infallible or that it is cast in concrete. It should, however, bring into focus sufficient information and data so that the best possible considered and objective judgments can be made, using the most current data available when the data in the *Plan* is out of date.

This document, then, comprises the *Comprehensive Plan* for the CBJ and provides a logical, consistent and purposeful approach to managing community growth and development. The *Plan* will be a road map that guides residents and their public officials through appropriate courses of action, not only to identify areas suitable for specific types of development but also to assure more efficient utilization of the areas that have already been developed.

The *Plan* provides a vision of the community's future that has many dimensions. It is a means of reinforcing the city's importance as the State Capital, an opportunity to create access to the waterfront, and to develop a variety of housing choices. It is a means to preserve a high level of environmental quality and diverse yet cohesive social interaction. The *Plan* addresses current conditions in the community and provides leadership and direction in addressing these problems, as well as those anticipated to affect us in the foreseeable future.

Comprehensive Plan Vision and Guiding Principles

The City and Borough of Juneau is a vibrant State Capital that values the diversity and quality of its natural and built environments, creates a safe and satisfying quality of life for its diverse population, provides quality education and employment for its workers, encourages resident participation in community decisions and provides an environment to foster state-wide leadership.

To achieve this vision, the CBJ followed these principles in formulating its *Comprehensive Plan*:

- **A safe place to raise a family**. Maintain safe neighborhoods and circulation systems; provide public spaces and facilities that foster community interaction and cohesiveness.
- **Quality education from Pre-school to University levels**. Promote quality educational programs and experiences in the schools and lifelong learning for our residents as well as a healthy lifestyle with adequate recreational facilities, resources and programs. Support a vital arts community, celebrating our diverse cultural heritage and unique historic resources.
- **A balanced economy**. Ensure a balanced, sustainable and diverse economy, actively encouraging employment opportunities for residents of all levels and ages that provide a livable wage and a dependable municipal tax base.
- **Natural resources**. Highlight and protect our scenic beauty, protect our streams and fish and wildlife habitat and foster the sustainable use of our natural resources.
- **A balanced community**. Ensure a balance between natural resource protection and the built environment, the efficient provision of infrastructure and goods and services, and housing affordable to all income levels.
- **Neighborhood livability and housing**. Maintain the identity and vitality of our neighborhoods, actively pursuing affordable housing for a diversity of households while promoting compatible livability and high quality design in new buildings.
- **Mobility**. Provide an accessible, convenient and affordable transportation system that integrates vehicle, vessel, rail and aircraft transport with sustainable and innovative transportation options—including convenient and fast public transit service, particularly for commuters to work, and bicycle and pedestrian networks throughout the community.
- **Involved citizenry**. Solicit resident participation and leadership in implementing the *Plan* policies and actions from all sectors of the community, encouraging mutual understanding and cooperation among all.

Community Setting

The CBJ is located in the central portion of the Alaskan panhandle, approximately 700 miles southeast of Anchorage and 950 miles north of Seattle (see the City and Borough of Juneau Vicinity map). Because of its mountainous terrain and great distances to other urbanized areas, the CBJ is accessible only by sea and air. There are no roads from Juneau to other southeastern Alaska communities or the Canadian interior.

Covering an area of more than 3,250 square miles, the CBJ is bounded on the west by Lynn Canal; on the east by the Canadian border; on the south by the Petersburg Borough; and on the north by the Haines Borough (see the City and Borough of Juneau Boundary map). In 1991, an approximate 150 square mile portion of northern Admiralty Island, encompassing the Greens Creek Mine, was annexed into the CBJ.

About 90 percent of the total area of the CBJ consists of water or rugged mountains and glacial within the boundaries of the Tongass National Forest. While this remote area is more difficult to use and develop, it is a very important resource for the well-being of the community and is addressed in this *Plan*.

Community History

The place we call Juneau has always been an important economic and cultural center due to its location, ecosystem, abundant resources and people. Juneau lies within the homeland of the Auk Kwaan people who flourished for thousands of years before European contact. They were joined by Taku Tlingit from the north and later by Haida and Tsimshian people from the south, and by Asian and other migrants. Tlingit culture is organized into many clans or kwaan within a system of two moieties, Raven and Eagle.

Russian, Spanish, English and later American ships came to the region starting in 1741, when Captain Vitus Bering sailed a Russian ship here. Trading in seal and sea otter pelts drew these visitors, who named many of the landmarks in the region as they charted its coastline. Original Tlingit names for these places are still well known. Russian dominance over the region began with the establishment of the Russian America Company in 1799 in Sitka, the Capital of Russian America. Alaska was sold to the U.S. in 1867.

In 1880 Richard Harris and Joe Juneau, gold prospectors, arrived here and were shown to gold deposits in Last Chance Basin-Gold Creek by Tlingit leader Kowee. Tlingit people moved to town for the jobs that opened up with mining. Thousands of miners came to travel the Chilkoot Trail from Skagway to the Klondike for gold exploration, later to work in the Treadwell, Alaska Juneau and smaller mines, until 1944 when the Alaska Juneau mine closed. By this time, Juneau's and Alaska's economies had diversified. The Capital moved from Sitka to Juneau in 1906. Territorial government expansion added construction jobs and new housing. World War II stimulated road construction and military expansion, including the Coast Guard here in Juneau and air transportation. Retail trade, fishing, and timber extraction guided by the United States Forest Service expanded.

In response to serious hardships imposed on the indigenous population by the incoming miners, prospectors, and other white settlers, the ANB (Alaska Native Brotherhood) and ANS (Alaska Native Sisterhood) were formed in 1912 to fight for economic, voting, and human rights including the right to be educated. In 1936, The Alaska Act led to the founding of Douglas Indian Association and the Central Council of Tlingit and Haida Indian Tribes, as federally recognized Alaska tribes.

Statehood became a reality in 1959, and Juneau's population, housing, and infrastructure grew in response. The Alaska Marine Highway provided connections to all of Southeast, to the Alaska road system starting in Haines and to the "Lower 48" states through Seattle and later Bellingham. Fisheries rebounded with the abolition of fish traps.

With the discovery of oil at Prudhoe Bay, native land rights were finally settled by the Alaska Native Land Claims Settlement Act of 1971. Sealaska and Goldbelt Corporations became major landowners in the CBJ. Neighboring community corporations and non-profit organizations of Hoonah and Angoon were formed and operate today in Juneau. SEARHC medical system and numerous non-profit organizations were formed. The Alaska National Interest Lands Act of 1980 established National Parks, Wilderness Areas, and Monuments, including nearby Misty Fjords, Admiralty Island National Monument, and Glacier Bay National Park. These wilderness designations continue many controversies regarding forest, environmental and native lands and their use.

The 1980's were a time of uncertainty for the capital in Juneau, and for our economy. Builders feared the capital move and were reluctant to build new housing. As the Capital became more secure, "Capital Creep", or the movement of state jobs to other areas of the state escalated. Large multinational corporations including Costco, Fred Meyer, Walmart, Home Depot, and Safeway changed the retail landscape. Development in Juneau's historic district expanded as cruise ship passenger numbers increased, although this trend has fluctuated.

In the 1990's, population rose slightly with the development of Greens Creek Mine, fishing, and tourism primarily, but housing lagged. City, state and federal capital expenditures provided employment as these buildings were constructed. Now Kensington Mine operates nearby. The University of Alaska and federally-sponsored research institutions have proliferated.

Juneau's population is estimated to be 32,290 in 2011. With these trends, new community and CBJ efforts are ramping up to meet the housing challenge. Our population is much more diverse than it was before Statehood in 1959. Juneau is the regional hub of southeast Alaska, as well as the capital of the state of Alaska. Our population

now includes close to 20 percent who identify themselves as at least partially Alaska Native or America ancestry.

Filipino and other Asian people now comprise eight percent of the local population. This increasing diversity is spread across most sectors of the economy, including government, Native corporations, fisheries, mining, tourism and local businesses. Our artistic, musical and cultural programs and people are flourishing as well, as this diversity of population and economy brings out creative and innovative approaches to our community's challenges. Government and university expansion has brought higher wage earners and a better-educated population to Juneau, with corresponding increases in many recreational opportunities, schools, and programs for youth.

[The Planning Commission acknowledges that the brief history above may not be entirely accurate or complete. However, the Planning Commission is committed to revising the historical section of the Comprehensive Plan in consultation with scholars, appropriate Native organizations, and other cultural groups prior to the next Comprehensive Plan revision.]

Study Area and Plan Organization

The study area of the *Comprehensive Plan* (*Plan*), which largely corresponds with the roaded area, contains land most suitable for future development due to its proximity to existing urban uses, physical characteristics and ownership patterns. The area includes downtown Juneau and Douglas, as well as the communities of West Juneau, North Douglas, Salmon Creek, Switzer Creek, Lemon Creek, the Mendenhall Valley, Auke Bay, Thane and the "Out the Road" communities of Lena Point and Tee Harbor. Generally, existing development is linear, confined to a narrow bench of land between the sea and the steeply rising mountains to the northeast on the mainland as well as along the eastern and northern coastline of Douglas Island. The major exception is the Mendenhall Valley, which is a broad, generally flat, glacial plain.

The *Comprehensive Plan* of the City and Borough of Juneau guides the government of the City and Borough of Juneau, which is often referred to as the "CBJ" or the "CBJ government" in the *Plan*. The boundaries of the City and Borough are also, on occasion, referred to as the "CBJ" or as the "City and Borough;" the context of the reference should make it clear whether the reference is to the government or to the physical boundaries and land within the boundaries of the City and Borough. As a planning document that was developed through community outreach and involvement, and which affects the residents of and visitors to the community, references are also made to the "community" of Juneau, or to "Juneau" in general. Again, the context of the reference should make the intent clear, but there will no doubt be instances in which confusion arises as to whether the government, land area, or people of Juneau are being referenced; the 2013 Update aims to reduce the potential for any such confusion by replacing most references in the 2008 Update to the "CBJ" with more specific terminology as discussed above.

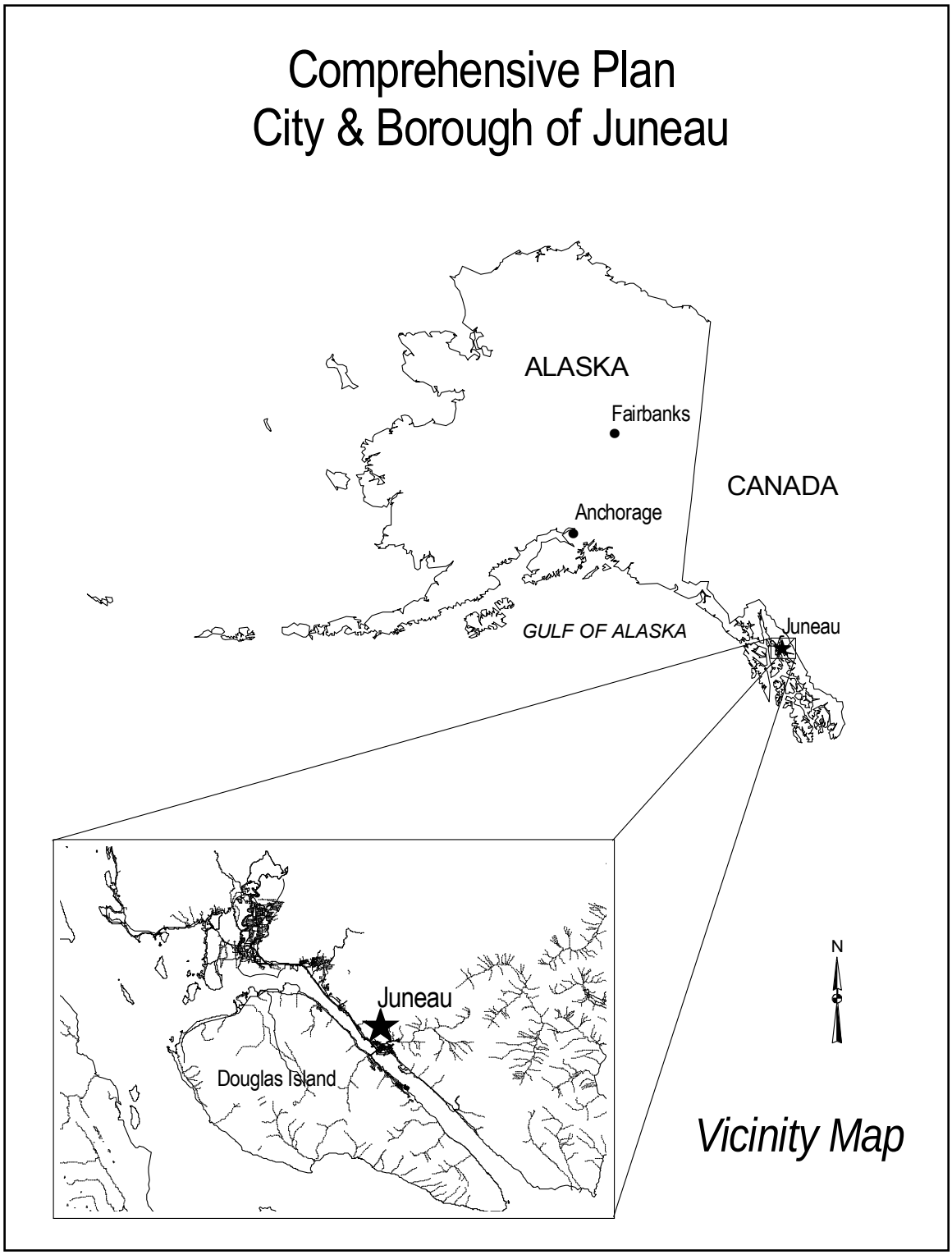
The City and Borough of Juneau's *Comprehensive Plan* consists of 18 chapters. Each chapter contains one or more subject Policy along with its implementing Standard Operating Procedures (SOPs), Development Guidelines (DGs), and/or Implementing Actions (IAs). Each policy number corresponds to the Chapter in which the policy is found and each numbered policy is preceded by a preamble discussion of findings that form the foundation and planning rationale for the policy. Each SOP, DG, and IA is numbered to correspond to the Chapter and Policy it supports or enacts. This numbering system can be summarized as follows: Chapter #.Policy # - Subtype (SOP, DG, or IA) #.

Thus, a citation of Chapter, Policy, SOP, DG, or IA is written in the following manner:

3	Chapter 3
3.1	Chapter 3, Policy 1
3.1 - SOP2	Chapter 3, Policy 1, Standard Operating Procedure 2

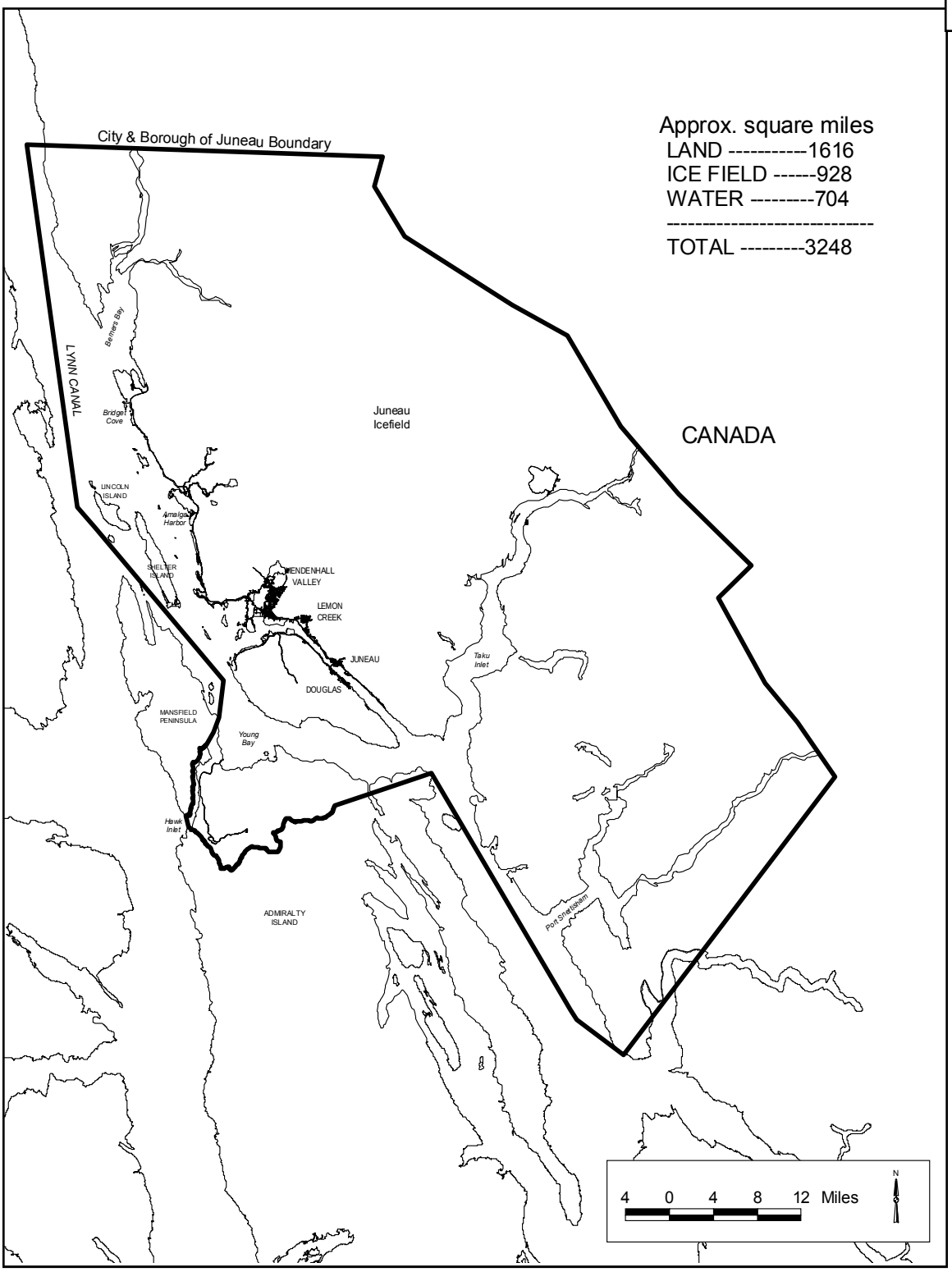
The policy statements are the most significant parts of the *Plan*. Policies are statements establishing a course of action for the CBJ government by providing the basis for guiding ongoing decisions related to land use, preparation of land use regulations, capital improvement programs, and funding of services to its residents and visitors. The policy was formulated to reflect community values, goals and objectives articulated in neighborhood and stakeholder outreach meetings and opinion surveys conducted as part of this *Plan* Update. These goals express community needs or desired actions such as: Maintain a safe place to raise a family; provide quality education from pre-school to the University level; protect streams and wildlife habitat; provide affordable housing and jobs

for generations; and assure access to the water and forested areas for humans, fish, and wildl
presented in this *Plan* reflect these values and goals and express commitments to action derived from the stated goal. The *Plan* is a declaration of public policy to achieve community goals and reflect community values. The policies were also crafted to positively address the community strengths, weaknesses, opportunities and threats, as identified by the Planning Commission during the 2007-08 *Plan* update process, and as refined during the 2013 *Plan* update.



Map 1.1

City and Borough of Juneau
Vicinity Map



Map 1.2

City and Borough of Juneau Boundary Map

The *Plan* is a long-range document that lays out the blueprint for guiding development and conservation actions over its 20 year planning period, to the year 2033. Within this time frame, the CBJ government's policy decisions and allocation of resources will be measured by how those actions positively address the Policies contained within this *Plan*. Staff, community members and decision-makers will measure permit applications, capital improvement proposals and local funding applications by the Policies and their Standard Operating Procedures and Development Guidelines, as well as the relevant Subarea Guidelines of this Plan. Typically, many policies will be applicable to a proposed project or action, and decision-makers will need to weigh the effect of the proposal on the particular

resource(s) that the policy seeks to provide or protect. Decision-makers will need to consider the overall impact of the proposal on the policies and guidelines, taking into consideration the:

- Short-term and cumulative effects of the proposed project to the local and borough-wide environment;
- Availability of public financial resources to service the project; and
- Overall merits of the proposal.

SIDEBARS:

New to the 2013 Update of the CBJ Comprehensive Plan, the use of sidebars allows the inclusion in the plan of data, examples, and other background information that are not intended to describe CBJ policy or to be considered when reviewing a project, ordinance, or budgetary decision's consistency with the Comprehensive Plan.

Each policy statement is generally followed by a SOP, a DG, and/or an IA that are the practical means of putting each policy into effect. The SOPs inform developers, property owners and permit review staff of a particular resource to consider or agency to consult when reviewing relevant permits. For example, Economic Development Policy 5.10 seeks to designate sufficient land for commercial and industrial development as part of an overall economic development program. The associated 5.10 - SOP1 and 5.10 - SOP2 advise staff and decision-makers to consult and consider the location criteria of each industry when allocating land to that use.

The DGs express directions, standards or values about a particular community resource, either for its development or conservation. The DGs are intended for property owners and/or permit Applicants to become aware of special treatment and review needed to assess the development or conservation of the subject resource. For example, 5.11 - DG2 for Policy 5.11 suggests that when allocating city-owned lands for commercial or industrial businesses, the CBJ government should favor local "basic sector" industries that provide employment with medical benefits over candidate businesses that do not provide those benefits.

The IAs describe how the Policy should be implemented and would include such actions as recommended ordinance changes, map revisions, studies and financing mechanisms. For example, 5.11 - IA1 for Policy 5.11 seeks to amend the Land Use Code to create a heavy industry zoning district wherein retail, office or other commercial uses and housing would not be permitted and, therefore, could not encroach upon scarce land suitable for manufacturing or other heavy industry.

Future Direction

This *Plan* provides guidance to residents and local officials as they decide the location, intensity and timing of future public and private development, as well as conservation measures. The community's growth is affected by complex physical, economic, and social factors.

The future of the community is inter-twined with the future of the state of Alaska. This is true, to an extent, for any town in Alaska because so much of a given city's budget is dependent on state funding and state-sponsored improvements. In Juneau's case, as the Capital City, the state's fortunes are far more significant. Alaska has depended on oil for the vast bulk of its revenue and general well-being. No political/economic scenario now under discussion suggests that the state will ever again enjoy the oil revenues it experienced in the early 1980's.

All scenarios point to a continued reduction in state spending and services. If the community is to grow, however modestly, or even stay in a steady-state economically, there will have to be some growth in other sectors of the economy to make up for continuing reductions in services to local governments and the number of state employees based in Juneau. If Juneau is to retain its status as the state's Capital, it needs to be viewed as a vibrant, modern, efficient, culturally-rich, affordable and livable city—one in which state legislators look forward to spending several months each year and, to some degree, would aspire to pattern their home cities, towns and villages after.

CHAPTER 2
SUSTAINABILITY

In Resolution 2401, and again in Resolution 2528, the City and Borough of Juneau Assembly committed the CBJ government to a sustainable future that meets today's needs without compromising the ability of future generations to meet their needs and accepted its responsibility to:

- Support a stable, diverse, and equitable economy;
- Protect the quality of the air, water, land, and other natural resources;
- Conserve native vegetation, fish and wildlife habitats, and ecosystems;
- Minimize human impacts on ecosystems; and
- Minimize energy usage and the release of greenhouse gases.

The concept of sustainability describes a condition in which human use of resources, required for the continuation of life, is in balance with nature's and society's abilities to replenish them. Sustainable communities:

1. Dedicate resources to bring plans for a sustainable future to fruition;
2. Are dedicated to the vitality and integrity of local and global systems;
3. Recognize that the social, economic, political, built, and natural environments need to be managed to sustain a balance, now and in perpetuity;
4. Follow principles that encourage the efficient use of, and avoid the waste of, energy, water, raw materials, and resources, with the goal of preventing environmental degradation;
5. Meet human needs for productive, comfortable, and safe lives; and,
6. Are resilient to social, environmental, and economic challenges.

Resolution 2593, adopting the *Juneau Climate Action and Implementation Plan* (JCAP), was adopted in 2011, and reiterates the need for investigation and action on greenhouse gas emissions, targets, and other opportunities for energy efficiency and implementation of the JCAP.

The *Plan* is infused throughout its chapters with strategies that call for short-term actions that support long-term sustainability. The Vision Statement and Guiding Principles of the *Plan* stated in Chapter 1 provide the framework for developing Sustainability Indicators that guide and measure the viability and adequacy of all *Plan* Policies, SOPs, DGs and IAs.

POLICY 2.1. TO BUILD A SUSTAINABLE COMMUNITY THAT ENDURES OVER GENERATIONS A SUFFICIENTLY FAR-SEEING AND FLEXIBLE TO MAINTAIN THE VITAL AND ROBUST NATURE OF ITS ECONOMIC, SOCIAL, AND ENVIRONMENTAL SUPPORT SYSTEMS.

Implementing Actions

2.1 - IA1 Support the CBJ Commission on Sustainability in completing its mission and tasks to:

A. Provide ongoing development of sustainability indicators and measures; and,

B. Periodically review the indicators and measures to confirm their currency and relevance and to track community trends.

2.1 - IA2 Incorporate the adopted sustainability indicators into the process of scoping, funding, and carrying out all proposed CBJ Capital Improvements including buildings, facilities, equiment, and components.

2.1 - IA3 Lead a community-wide discussion on the inevitable high costs of importing fossil fuel to the community and the impact of future fossil fuel scarcity. To help the community prepare for and adapt to this future scenario, develop community awareness, actions, and programs that will contribute to energy self-sufficiency.

2.1 - IA4 Maintain the greenhouse gas emissions inventory updates annually as recommended by the 2011 *Juneau Climate Action and Implementation Plan* (JCAP), as well as other recommendations of the JCAP to reduce Juneau's energy consumption and carbon footprint, and community education. Communicate the findings to the community in a variety of forums with the goal of identifying ways to reduce Juneau's energy consumption and carbon footprint.

2.1 - IA5 Provide ongoing information on the need to adapt to climate change with the goal of developing a community response to negative local impacts.

2.1 - IA6 Develop and implement a variety of incentive programs to stimulate innovative conservation practives in residential, commercial and governmental sectors.

2.1 - IA7 Initiate community development programs to attract sustainable businesses to Juneau and the Southeast Alaska region.

2.1 - IA8 Support socio-economic and cultural diversity with the goal of creating and maintaining a community where individuals can live and thrive for the duration of their lives.

2.1 - IA9 Protect ecosystems surrounding the community and preserve their inherent biodiversity.

2.1 - IA10 Support the individual and commercial production of foods locally with careful evaluation of environmental impacts.

2.1 - IA11 Provide ongoing support to sustain Juneau as a robust governmental center and as a regional hub for goods and services.

2.1 - IA12 Amend the Land Use Code to create a new land use category for small-scale energy production facilities, such as solar panels and residentially-scaled wind turbines, so that they are not held to the same permitting requirements as industrial-scale energy production facilities.

2.1 – IA13 Adopt energy-efficiency guidelines and/or standards to encourage LEED or similar certification eligible construction by the public and private sectors.

POLICY 2.2. TO MODEL SUSTAINABILITY THROUGH ITS OPERATIONS, PRACTICES, AND PROJECTS.

Standard Operating Procedures

2.2 - SOP1 Perform ongoing analyzes and evaluation of the sustainable implications of CBJ government operations, practices, and projects.

Implementing Actions

2.2 - IA1 Complete energy and carbon audits for all CBJ government buildings, facilities, andtransportation components (public transit, fleet vehicles, etc).

2.2 - IA2 Identify opportunities throughout the CBJ government to conserve energy, use alternative fuels and renewable energy sources, and reduce the community's carbon footprint.

2.2 - IA3 Develop administrative policies and procedures, create employee incentive programs, and reward new sustainability promotion ideas that can be practically implemented by CBJ government. Such programs might encourage ride-sharing, more efficient ways to use the city's vehicle fleet, and active participation in recycling.

2.2 - IA4 Monitor and measure conservation initiatives and alternative approaches of CBJ government programs at a minimum annually, with ongoing review and refinement from "lessons learned."

2.2 - IA5 Maintain and enhance performance standards for the design of all new or renovated CBJ government buildings and provide funding incentives for higher levels of performance.

2.2 - IA6 Identify and develop the sustainability expertise of CBJ staff and develop strategies for using the expertise collaboratively throughout CBJ government.

Sustainability Indicators

Indicators show how well a system is working. Effective indicators are:

- Relevant: they show you something about the system that you need to know;
- Easy to understand, even by people who are not expert;
- Reliable: you can trust the information that the indicator is providing;
- Based on accessible data: the information is available and reported at regular intervals.

Indicators help a community judge progress towards its long-term goals. Over time, a community will adjust policies, programs, and collective behavior according to the trends that emerge from using indicators. Indicators reveal the status of large systems, helping a community focus on long-term planning.

Developing indicators begins by selecting important, diverse, measurable categories and topics that the community will commit to measure at regular intervals.

Indicators will be developed by the Juneau Commission on Sustainability and used by appropriate CBJ government agencies and community groups. They will be developed from ongoing issues that emerge in the community. The issues will be organized around social, economic, and environmental categories, although it is expected that issues will overlap categories. The indicators and issues are expected to be modified over time, as the community evaluates its actions and as conditions change. The community's level of sustainability will be measured by evaluating the community's actions, projects, and operations with respect to the indicators. The indicators will generate discussion among people with diverse backgrounds and interests, and, through the process, will help create a shared vision of where the community wants to be.

POLICY 2.3. TO DEVELOP AND USE SUSTAINABILITY INDICATORS TO MEASURE JUNEAU'S PROGRESS TOWARD BECOMING A MORE SUSTAINABLE COMMUNITY.

Standard Operating Procedure

2.3 - SOP1 Measure CBJ capital improvements, projects, ordinances, and purchases against adopted sustainability indicators to ensure that the community is moving toward a sustainable future.

Implementing Actions

2.3 - IA1 Support the CBJ Commission on Sustainability in completing its mission and tasks to:

Provide ongoing development of sustainability indicators and measures;

Periodically review the indicators and measures to confirm their currency and relevance and to track community trends; and,

Incorporate the adopted sustainability indicators into the process of scoping, funding, and carrying out all proposed CBJ Capital Improvements including buildings, facilities, equipment, and components.

2.3 - IA2 Periodically assess whether adopted sustainability indicators are measuring sustainability as intended, and amend them as necessary to improve their utility.

CHAPTER 3
COMMUNITY FORM

Existing Character

The 1984 and 1995 *Comprehensive Plans* were based in part on an anticipated 3 to 4 percent annual increase in population through the late 1990's. In fact, the rate of growth in both population and jobs hovered around 1 percent and is expected to continue at this pace over the 2013 Plan's 20-year planning horizon. This is based on state revenue projections and projected employment in the community's basic economic sectors of government, mining, tourism and food processing. However, with the slow rate of housing production over the past few years, relative to the increase in population (Table 2), there is a need for new residential development in areas that are provided with public sewer, water, and road access. The CBJ government seeks to guide development patterns in order to assure the following results:

- Protection of the scenic beauty, fish and wildlife habitat, watersheds and outdoor natural recreation resources that all Juneauites and visitors value and enjoy;
- A balanced economy with a vibrant value-added export industry that provides a livable wage and medical benefits to its employees;
- Sufficient development opportunities to meet a broad range of residents' needs and lifestyles; and
- Compact development within the urban service area (in-fill development) to make the most efficient use of vacant land that is already provided with water, sewer, roads and other utilities and community services, particularly transit, schools and shopping.

The CBJ's land area has four distinct community forms that appeal to a diverse population. Each type of community form satisfies the lifestyle of the residents living therein and those residents have expressed a strong desire to protect and enhance this community form.

Urban: Urban areas are represented by downtown Juneau and Douglas, West Juneau, medium-density areas of Lemon Creek and Switzer Village, the mixed use area around and between the Mendenhall Mall and Nugget Mall, and the village area around Auke Bay Harbor and the University. In these urban areas, residential, commercial, mixed use and and/or public facilities share land and utilities in a compact area. Urban areas are characterized by low- to mid-rise residential and commercial structures, often with the uses mixed within the same structure or with commercial uses lining the edges of residential neighborhoods. Typical mass and scale of these urban neighborhoods are 2 to 3-story structures separated by parking lots, roads, sidewalks and landscaping or small yards. Medium to high residential densities of 10 to nearly 400 residential units per acre can be found in the downtown Juneau area; densities of 14 units per acre can be found in the West Juneau Area; densities of seven units per acre can be found in the Lemon Creek and Switzer Creek areas and in the Auke Bay area.

Suburban: Suburban areas can be found in the area east of the Mendenhall River, north of the airport and west of Thunder Mountain. This area contains the suburban scale neighborhoods of Hidden Lakes, Pleasant Gardens, Mountain View, Kristel Meadows, Montana Creek Road, the Mendenhall Loop Road area, and Glacier Village, among others. Some commercial and industrial developments can be found in clusters within these suburban areas. Those non-residential uses should provide land areas that serve as buffer zones between their operations and adjacent residential uses. The suburban scale is characterized by low densities represented by single-family, detached homes built to 3 to 5 units per acre. Typical suburban mass and scale reflects 1 to 2- story homes with

attached garages on parcels smaller than 1/3 acre. Discretely integrated within these suburban neighb are smaller accessory apartment dwelling units located within the principal home, above or within a garage, or separately on the property. Structures are separated by modest yards, streets, sidewalks, and landscaping. Where the carrying capacity of roads permit, vacant parcels within the suburban neighborhoods served by sewers should be developed at higher residential densities to make most efficient use of public services and infrastructure therein. Accessory apartments and/or small bungalow homes on small lots can achieve this higher density while maintaining the suburban character of the neighborhood.

Rural: Rural areas can be found in the forested areas west of the Mendenhall River and in Thane, North Douglas and the out the road areas of Tee Harbor, Lena Cove, and Indian Cove.Residential densities are low at 1 to 3 units per acre. Many of these areas are served by public water but not public sewer service. If and when public sewer service is provided to rural areas, higher residential densities should be permitted in order to make the most efficient use of this sewer resource. Vacant parcels within rural neighborhoods that are provided municipal sewer service should be developed at suburban densities, although with site design and massing that reflects the rural character of the neighborhood.

Rural Remote: The rural remote areas can be found in the non-roaded areas of South Douglas, Taku River, Shelter Island and other islands within the borough. These areas are characterized by natural resource management and conservation activities and extremely low density homestead-style cabins or homes. The areas are served by few public services, no public water or sewer, and limited police and fire protection. Rural dispersed residential development is intended to occur at a density no greater than one dwelling unit per acre; in some circumstances, densities as low as one unit per 40 acres may be desired. In areas encompassing sensitive fish and wildlife habitat and other natural resources, subdivision of less than 40 acre lots may not be appropriate.

New Development

New development within the 20-year planning horizon of this *Plan* should occur as in-fill development on vacant or underutilized parcels within the Urban Service Area. In the future, new development could occur as new towns or satellite communities in the Echo Cove and West Douglas New Growth Areas designated in this *Plan*.

Compact "In Fill" Development Within the Urban Service Area: This *Plan* designates an approximately 23.9 square mile area within the urban and suburban areas of the City and Borough of Juneau boundaries as an Urban Service Area, within which water, sewer, access roads and other community services are provided or will be in the near future. Providing community services to this compact area is efficient and convenient for users. There are over 100 vacant parcels within the Urban Service Area boundary (USAB) of which from 30 to 60 can be deemed vacant buildable parcels, ranging in size from 1 to 150 acres. Buildable land is considered to be vacant or underused land that is relatively flat and dry; that is, with slopes of less than 18 percent and without high value (Class A and B) wetlands.

Land within the USAB should be efficiently developed before its boundaries are extended to properties outside of the USAB. An efficient development would build to the maximum density allowed by the zoning district within which the property lies, provided that road and intersections serving the new development have adequate capacity and levels of service to accommodate the proposed intensity of development. Buildable lands should be developed as medium- to high-density affordable housing or mixed residential and commercial developments wherever possible and practicable. This is particularly true for lands located within walking distance (approximately one-quarter mile) of public transit service.

Rural Area: Care should be taken that land outside the USAB is not developed at densities with well water and septic sanitary sewer systems in an incremental fashion, such that these on-site septic systems, upon cumulative development in the area, would fail. This has happened on North Douglas and the CBJ government has had, at great community expense, to remedy the unsanitary septic systems by extending municipal sewer systems to those neighborhoods. This should not be repeated and great care should be taken to ensure that the zoning designations, and their associated density controls, are appropriate for areas not served by municipal water and/or sewer services. Land outside the USAB containing natural resources in need of protection from development, or that is unsuitable or not needed for more intense urban development, should be designated and zoned for rural or resource conservation purposes. Urban services are not to be planned for, or extended to, these rural areas. New Growth Areas, as defined below, should have their own self-contained water, sewer, utilities and public services and cannot rely on extensions of municipal services to those areas in order to develop.

New Growth Areas: These are areas in remote areas that are suitable and available for future u scale development when specifically approved by the CBJ government in accordance with the procedures and criteria set out in this *Plan* and in the CBJ Land Use Code. These areas are viewed as new, self-contained towns or villages within remote areas of the borough. They would have a distinct identity and would plan for adequate commercial, residential, health care, educational facilities and public utilities and services. Certain small-scale, non-residential uses, such as port facilities, resource-related industrial development (e.g., a lumber mill or fish processing plant), or recreational or resort uses, may be appropriate, on an interim basis, on portions of areas designated by this *Plan* as a New Growth Area prior to New Growth Area plan approval.

The designated New Growth Areas in Echo Cove and West Douglas Island would each be a self-contained urban area providing a full complement of public services and facilities. Development of housing and services to this housing should occur in compact areas and should represent a minimum residential density of ten residential units per gross acre, which would:

1. Provide the most efficient use of buildable land within these areas;

2. Best accommodate population and economic growth;

3. Provide affordability in housing; and,

4. Make efficient use of transportation facilities and services and other community services provided to those areas.

Transition Area: These lands are located within the Urban Service Area and are not yet provided public sewer service. When provided with sewer service, and when roadway and intersections serving these lands have adequate capacities to accommodate new development (such that post-development, the road and intersection Levels of Service would not be worse than LOS D), transition areas should be rezoned for the designated higher density residential development. Transition areas are designated as the intended higher density on the Comprehensive Plan land use maps, but rezoning these areas to match the land use designation must wait until public sewer service is extended to them.

Adequate Development Opportunities

Private and public land ownership patterns within the borough have a significant impact on the location of future urban development. Most of the community's flat, dry parcels within the USAB or the roaded area have been developed. Due to its location at the intersection of a steeply sloped rainforest and the sea, most of the undeveloped land is constrained by steep slopes, avalanche hazards, anadromous fish streams, and wetlands and are either unbuildable or are very costly to build upon.

Most of the community's land that is designated for commercial use is either developed or large portions of the land are wetlands and may be unbuildable. Similarly, the community's industrially-zoned lands are either developed, contain wetlands, or feature steep terrain that is unsuitable for industry. A major effort in the 2008 *Plan* Update was the identification of buildable land within or adjacent to the USAB to designate for commerce, industry and housing, and particularly housing at densities that could be affordable to low- or moderate-income households. Unfortunately, this search did not result in finding much buildable land that is readily suitable for development. About 120 CBJ-owned vacant parcels located within the USAB were studied and, of those, only two were deemed buildable within the next few years, as they had relatively easy access to public water, sewer and roads. These two buildable sites (one above Dzantik'i Heeni School, and one under Thunder Mountain), representing about 80 buildable acres, could accommodate about 800 small homes, depending upon the site design. Most of the CBJ-owned candidate sites studied were deemed unbuildable due to steep slopes, presence of high-value wetlands, or avalanche hazards. Two CBJ-owned sites near the University could be buildable within the 20-year planning horizon, once new access roads, intersection capacity improvements to arterial roads serving those properties, and the extension of water, sewer, roads and other utilities to the properties take place. [Also see Figures 4.7 and 4.8 in the following chapter]

One of the primary responsibilities of the CBJ government is to facilitate future growth by ensuring that adequate land is available when needed and in providing a level of public services and facilities sufficient to promote public health, safety, and convenience. Typically, it is advisable to have more than a 15-year supply of vacant land

commerce, industry, housing and public utilities and facilities to facilitate choice in location, price and development. The CBJ government is no longer in a position to provide this inventory of land zoned for those uses, as most of the undeveloped land in the borough is dominated by wetlands, forests, steep slopes, variable terrain and/or is inaccessible by roads. Very few land uses can effectively use this type of terrain and, if they could, the costs to engineer development on those lands, while mitigating environmental impacts, is, today, cost- prohibitive to all but high-priced, low-density residential uses. The CBJ government needs to be very efficient and prudent in how it allocates land uses on the few remaining vacant buildable parcels within the USAB.

Due to this paucity of flat, dry land within the sewered USAB, it is critical that the CBJ government identify the most buildable lands within the USAB and make the most efficient use of those limited resources by increasing residential densities along public transit corridors and, in exchange for these economic benefits to private developers, require the inclusion of long-term low- and moderate-income affordable housing units throughout the new development.

One mechanism the CBJ government has used in the past to provide some opportunity for more efficient use of land, while assuring adequate community services to these lands, has been use of the transition zone concept, applicable to areas located within the USAB but not yet provided public sewer and/or water service. A designation in a transition zone specifies the lower density zone that can be accommodated by well and/or on-site septic service and it specifies a higher density zone that may go into effect with the provision of public water and sewer and adequate roads to the property. This tool is used in the regulatory Zoning Maps, but is not used in the Comprehensive Plan Land Use Maps, which are aspirational in nature.

Another mechanism is the designation of vacant CBJ-owned buildable sites within the USAB for medium- to high-density residential uses. The CBJ government would identify the areas of these parcels that are buildable; that is, absent high-value wetlands or slopes greater than 18 percent. The CBJ government would then conditionally-rezone these parcels to require the development of a specific density, mix of land uses, site plan, development standards, and levels of housing affordability. The CBJ government would then release those parcels to a for-profit or non-profit development corporation who would immediately build the project and assure the affordability of the designated affordable units therein. This same approach could be offered to private owners of vacant properties within the USAB by creating an Affordable Housing Overlay District land use designation or zoning district. Such an overlay district would allow owners of vacant residentially-, commercially-, or mixed use zoned land to apply to develop their property with specific land uses, densities, building heights and scale, site plans, open space/natural areas, recreation and conservation areas, development standards and affordability requirements specified for the overlay zone.

Unfortunately, many of the privately-owned vacant parcels are located in areas that are served by collector or arterial roads that have reached their carrying capacity; that is, these roads are severely congested during peak morning and evening travel periods. The Alaska Department of Transportation Public Facilities (DOT & PF) traffic studies available for these areas indicate that the Levels of Service (LOS) for numerous intersections in the Mendenhall Valley, Juneau and Douglas Island areas are already at LOS D, E and F during peak periods. A LOS A indicates free flow of traffic whereas a LOS D would indicate frequent delays in entering the intersection. A LOS E would require several minutes of delay in entering an un-signalized intersection, particularly if intending to make a left turn onto the road. A LOS F indicates that the traffic volume exceeds the road's or intersection's design capacity and would require more than one cycle to enter a signalized intersection and several minutes wait to make a left turn onto the road. Levels of Service worse than LOS D are unacceptable levels when considering adding new traffic-generating uses to these affected roads. Until roads and intersections are improved to LOS D or better, generally only land uses that generate traffic during off-peak periods, or that would assure that new patrons or occupants would use public transit services, should be accommodated. [Please also see the Levels of Service discussion in the Transportation Chapter (8) and in the Glossary]

Transit Oriented Development

There are over 100 vacant parcels, ranging in size from one to 113 acres and totaling about 600 acres of land that are located within one-quarter mile of an express bus route and are served by municipal water and sewer service. Some of these parcels contain welands. At a minimum, about 30 privately-owned vacant or underutilized parcels are located within walking distance, or one-quarter mile, of existing and proposed public transit routes and should be designated for medium-to high-density residential or mixed use development.

The 2008 *Capital Transit Development Plan* proposes a trunk line bus service from Auke Bay to downtown Juneau

to move riders quickly between major transit nodes, with local circulator routes serving the Me Lemon Creek, downtown, and Douglas. Vacant and underutilized lands within walking distance of new routes with short headways and transfer points can be designated for high-density residential or mixed use Transit Oriented Development (TOD) district within the area shown in the Bonus-Eligible Area Overlay District map.

Transit Oriented Development consists of dynamic, livable developments and/or neighborhoods focusing on compact, walkable communities centered on convenient express public transit systems. Depending on the location of the property, a dynamic mixed use development or higher-density wholly-residential development would be appropriate.

Typical Elements of a Transit Oriented Development:

- Safe, convenient pedestrian and bicycle connections from home and/or work to the bus station(s) with no more than two bus transfers to reach a final destination. Transit stations or bus shelters would provide adequate shelter, seating, lighting and signage.

- The urban design of the development in terms of block size, building height and massing, building orientation and ground-level frontage treatments would be pedestrian oriented. The ground-levels of commercial space would provide multiple entrances or have their only entrance onto a sidewalk, and transparency, that is, a ratio of windows and doors to the total frontage area should be at least 40 percent.

- Density should be medium-to high with three or more levels of housing; in some locations this may be located above ground-floor commercial space;

- A mix of housing types, sizes and price is important;

- Buildings should be oriented to provide "eyes" on public spaces and gathering places;

- Lower-than-normal parking requirements met on one or two levels with entries from a side street or the rear of the building. Typically, the parking demand and subsequent requirement is reduced to as low as one space per four dwelling units;

- A mix of pedestrian-oriented land uses and convenient shopping and personal service uses within walking distance;

- Walkable design of the public spaces and interior courtyards with pedestrian-scale architecture/ building massing, lighting, circulation patterns and landscaping;

- Direct connections to express public transit services within a 5 to 10 minute walking distance from each development or to collector transport systems; and,

- Support systems and facilities to encourage non-motorized transport as well as carpools, car-sharing programs and non-fossil fuel-burning vehicles (covered, secure bicycle storage and parking spaces with metered electric outlets).

Principles for Creating Livable Mixed Use Communities

- *Design on a Human Scale*

  Compact, pedestrian-friendly communities allow residents, workers and visitors to walk to shops, services, cultural venues, and jobs, reduce traffic congestion and improve people's health. Commercial space should face the street and should mimic a traditional Main Street development pattern with clear display windows, multiple entrances, all weather canopies and seating areas. There should be no blank walls facing public streets or walkways. Parking should be provided in the rear of structures with access roadways limited to side streets. Pedestrian pathways should be well-lit and protected from rain and snow.

- *Provide Choices*

  People want variety in housing styles and size and want conveniently accessible shopping, recreation, entertainment, transportation and employment. A variety of pedestrian-friendly uses creates dynamic neighborhoods and accommodates residents in different stages of their lives. Residential densities should be a minimum of 10 dwelling units per gross acre of land within the development with higher densities of 30 to 80 units per acre encouraged. These densities facilitate the efficient provision of frequent transit service, convenient shops and services, affordable development, and help create a vibrant street life.

- *Adapt to Urban Centers*

  Take advantage of the presence of adequate municipal water and sewer services, other utilities, roads and infrastructure by pursuing in-fill development on vacant land within the urban service area, adaptive re-use of vacant buildings and/or redevelopment of underutilized or older, obsolete buildings. In-fill and redevelopment structures should respect the overall character of the existing neighborhood, although building heights and densities will be greater. New developments should provide vehicular, pedestrian and viewshed connectivity to adjacent established neighborhoods.

- *Provide Transportation Options*

  Design safe, well-lit and convenient all-weather pedestrian pathways, separated bicycle lanes, sheltered bus stops; give preferential parking to carpool vehicles and car-sharing vehicles and provide preferential and metered electric energy stations for electric vehicles. Parking should satisfy the customer/patron needs of the non-residential space with minimal parking provided for residents and workers who are encouraged to take transit. Parking for businesses should be designed as parallel or angled parking along the storefronts rather than a sea of surface parking facing the roadway. Internal vehicle roadways should be designed for slow speeds to minimize hazards to pedestrians and cyclists. Pull-off lanes for transit, taxi cabs and school buses should be provided at convenient locations.

- *Provide a Central Public Gathering Space*

  Provide distinct entries to new developments and well-defined and safe public spaces that facilitate public gathering, celebrations, and face-to-face interaction and the viewing of public art. Cluster commercial uses around a common plaza or gathering space that could be integrated with the transit station for the development.

- *Protect Environmental Resources*

  Provide a balance of preservation of natural systems and new development; ensure that urban runoff and snow storage does not pollute waterways and nearby habitat; mitigate to eliminate or minimize noise, fumes and other air quality impacts; provide facilities to support non-fossil fuel-burning vehicles and buildings; provide convenient facilities to encourage recycling of solid waste materials; and encourage the reduction of the use of packaging materials and shopping bags by businesses, workers and residents of the area.

Other sections of the *Comprehensive Plan* address community form and community character issues more specifically; these are found in Chapters 4 (Housing Element), 5 (Economic Development), 10 (Land Use) and 11 (Land Use Maps).

POLICY 3.1. TO BALANCE AVAILABILITY OF SUFFICIENT LAND WITHIN THE DESIGNATED URBAN SERVICE AREA BOUNDARY THAT IS SUITABLY LOCATED AND PROVIDED WITH THE APPROPRIATE PUBLIC SERVICES AND FACILITIES TO MEET THE COMMUNITY'S FUTURE GROWTH NEEDS AND THE PROTECTION OF NATURAL RESOURCES, FISH AND WILDLIFE HABITAT AND SCENIC CORRIDORS.

Standard Operating Procedures

3.1 - SOP1 As part of the *Comprehensive Plan* implementation and updating process (see Chapter 18), monitor land availability for various land uses and designate adequate land on the Comprehensive Plan Land Use Map, as appropriate. An expansion or other amendment to the Urban Service Area boundary would be processed as an amendment to the Comprehensive Plan Land Use Maps.

3.1 - SOP2 Develop Capital Improvement Plans and budgets for public facilities and services that are needed to support the land use pattern determined in this *Comprehensive Plan*. Priority should be given to support infrastructure needed to facilitate compact, in-fill residential development along transit corridors within the Urban Service Area.

Development Guidelines

3.1 - DG1 When considering rezoning applications of land located within the Urban Service Area from an industrial zoning district to a commercial, mixed use or residential district, ensure that there is an adequate supply of land suitable for manufacturing or heavy industrial use elsewhere in the Urban Service Area in an area that can provide heavy weight-carrying-capacity roads and sewers [see also 10.7 - DG2].

3.1 - DG2 When considering rezoning applications of land located within the Urban Service Area from a non-residential zoning district to a residential or mixed use district; from a low-density residential district to a higher-density residential district; or from a lower building height district to a higher building height district, promote the development of new medium- (10 to 20 dwelling units per gross acre) to high-density (30 to 60 or more units per gross acre) residential developments that include dwelling units affordable to low-income households as a condition of the rezoning. The affordable units should be dispersed throughout the development, constructed at the same time as the market-rate units, and priced or rented to households with incomes no greater than 80 percent of the City and Borough of Juneau's Median Family Income (MFI) level by household size, as established annually by the U.S. Department of Housing and Urban Development (HUD).

Implementing Actions

3.1 - IA1 Revise the Land Use Code to allow, in zoning Transitional (T) zones, the higher density zoning designation to be allowed upon petition by the property owner and approval by the Community Development Department (CDD) Director, rather than by a rezoning action, provided that, as a condition of approval, the property owner ensures the provision of adequate municipal water and sewer service and provides adequate roadway capacity to serve the increased population. For example, a D-3 (T) D-10 could transition to D-10, and a D-l (T) D-5 could transition to a D-5 as a zoning map amendment, with CDD Director's approval, upon the financial assurance of provision of the water, sewer, road and intersection capacity at a LOS D or better prior to its development.

Suburban and Urban Area Development

The community's future community form depends upon transportation systems, utilities, natural areas and the amount of land available to meet projected demand for residential, commercial and industrial uses and the most appropriate allocation of land for these purposes.

Compact growth in suburban and urban areas is preferable because the use of land is more efficient; urban services are more economically provided and maintained; adverse environmental impacts are minimized; and the majority of residents who prefer a high level of services are better served. In-fill development on vacant lots, or the addition of accessory dwellings or small homes on small lots interspersed throughout an existing neighborhood, is encouraged.

Most commercial and industrial land is located within the Urban Service Area to ensure the provisio required high level of public services and facilities and to prevent intrusion into environmentally-sensitive and/ or resource-rich rural areas. Due to topography and private/public ownership patterns, the developed or urban portion of the community is linear, with major concentrations in the suburban areas of Mendenhall Valley, Salmon Creek, Lemon Creek and Auke Bay on the mainland, and Douglas and West Juneau on Douglas Island.

To make efficient use of limited buildable land and community services as well as to protect natural resources, compact urban development is preferred to urban sprawl. This is also true for the New Growth Area towns. By concentrating development, the CBJ government will limit the number of acres dedicated to urban uses and minimize the per-unit costs of extending sewer, water, utility lines and roadways. Significant reductions in travel, energy consumption and air pollution will result by encouraging the development of residential uses in close proximity to shopping, employment, cultural and recreational facilities.

POLICY 3.2. TO PROMOTE COMPACT URBAN DEVELOPMENT WITHIN THE DESIGNATED URBAN SERVICE AREA TO ENSURE EFFICIENT UTILIZATION OF LAND RESOURCES AND TO FACILITATE COST EFFECTIVE PROVISION OF COMMUNITY SERVICES AND FACILITIES WHILE BALANCING PROTECTION OF NATURAL RESOURCES, FISH AND WILDLIFE HABITAT AND SCENIC CORRIDORS.

Standard Operating Procedures

3.2 - SOP1 As part of an orderly update of the *Comprehensive Plan*, the CBJ government reviews and maintains an Urban Service Area boundary that defines the limits within which the full range of urban services, such as water and sewer, will be provided by the CBJ government. Such services should not be provided outside the Urban Service Area. After a thorough review of buildable land within the Urban Service Area, the CBJ government may seek to extend the Urban Service Area boundary to provide adequate land for compact development at a minimum residential density of 10 units per gross acre.

3.2 - SOP2 Adopt a Capital Improvement Program (CIP) that schedules community sewer, water, storm drainage, transportation improvements and recreational facilities for all areas within the Urban Service Area.

3.2 - SOP3 Establish specific policies and land use categories and land use map designations for the full range of needed land uses and activities with an emphasis on compact development of commercial and residential uses along express (fast service to distinct destinations) public transit corridors.

Rural Area Development

A majority of the land and water within the borough is located outside existing or planned urban areas on the roaded areas of the mainland or Douglas Island. In this *Plan*, this is referred to as the rural area. It is suitable for a broad range of activities including rural residential development, timber harvest, mining and sand/gravel extraction, scenic resources, fish and wildlife habitat, and many forms of outdoor recreational activities.

POLICY 3.3. OUTSIDE OF THE URBAN SERVICE AREA, PERMIT APPROPRIATE LOW-INTENSITY, LOW-IMPACT DEVELOPMENT THAT PROVIDES AN OVERALL PUBLIC BENEFIT IN RURAL AREAS, WHILE ASSURING THE PROTECTION OF NATURAL RESOURCES, FISH AND WILDLIFE HABITAT, WATERSHEDS, SCENIC CORRIDORS, PUBLIC ACCESS TO THE SHORELINE AND INLAND WATER BODIES, AND RECREATIONAL OPPORTUNITIES.

Standard Operating Procedure

3.3 - SOP1 Coordinate all planning and development decisions in the rural area with state and federal agencies with the applicable jurisdiction.

3.3 - SOP2 Designate on the Comprehensive Plan Land Use Maps and the Land Use Code Maps those publicly-owned land areas that warrant protection for:

A. Watersheds for future potable water sources;

B. Riparian habitat of anadromous fish streams and lakes;

C. Access to water and high recreational value; and,

D. Potential natural hazards, consistent with the Natural Resources Policies and Guidelines of Chapter 7.

Development Guidelines

3.3 - DG1 When developing roads, infrastructure or development projects within the rural and remote areas, ensure the protection of adequate un-fragmented fish and wildlife corridors along anadromous fish streams extending from the icefield and uplands to the sea.

3.3 - DG2 CBJ-owned shoreline lands that can provide non-motorized access to water bodies and that provide unobstructed views of the water from the shoreline and/or from public roads should remain in their natural state, with the exception of the provision of low-scale recreational facilities and convenience stations such as restrooms, boat launch and/or picnic facilities.

New Growth Area Development

New Growth Areas are defined as sites in rural or remote areas potentially suitable for mixed use with predominantly residential development and characterized by compact, urban densities and a self-contained, full complement of services and facilities, including roads, water and sewer, transit, recreational, educational and neighborhood-commercial services. Within New Growth Areas, specific sub-areas can accommodate regional support services and facilities such as port facilities, transportation- or resource-related industrial development.

The concept of New Growth Areas responds to the need for limited urban-level development opportunities located in remote areas; that is, areas located quite some distance from the existing Urban Service Area. New Growth Areas are particularly well-suited for selected lands owned by the CBJ, Goldbelt Corporation, and the state. There are two New Growth Areas—Echo Cove and West Douglas Island—that are shown conceptually on the Comprehensive Plan Land Use Maps for Subarea 1 and Subarea 9 of Chapter 11. The exact location, size, nature, timing and public/private involvement in the development of these areas will be determined in the future, via a master plan for each specific New Growth Area. The land within each New Growth Area can be expected to be developed with short-term uses that are permitted by the underlying zoning district designation until the infrastructure needed to safely and effectively access these remote areas is provided, such as roads, bridges, and docks.

Development of New Growth Areas as satellite communities was identified as the most desirable way to accommodate growth outside the urban area, rather than to continually sprawl outward from the Urban Service Area with low-density developments served by wells and septic systems. As master planned communities, the New Growth Areas can provide residents the advantages of urban living in an otherwise rural setting while minimizing incursion into environmentally-sensitive areas and making the provision of urban services cost-effective.

Under the provisions of the Alaska Statehood Act, the City and Borough of Juneau has acquired nearly 20,000 acres of state lands that were selected on the basis of their potential residential, economic, and recreational value. Much of this property is located in non-urbanized portions of the borough.

As a beneficiary of the Alaska Native Claims Settlement Act (ANCSA), Goldbelt, Inc., the local ANCSA Corporation, received title to nearly 4,000 acres of property at Echo Cove and on west and south Douglas Island. These tracts are potentially suitable for large-scale residential, recreational, resort, maritime, transportation and/or resource-related industrial development within the parameters of New Growth Areas. The CBJ government and Goldbelt, Inc. developed the West Douglas Conceptual Plan in 1997; Chapter 6 and Plate 1 of that plan have been adopted as additions to the *Comprehensive Plan*, and the nodes of development envisioned in that plan are shown as New Growth Areas on the Comprehensive Plan Land Use Maps (Chapter 11). Planning for a pioneer road accessing Goldbelt, Inc.- and CBJ-owned properties on northwest Douglas Island is underway at the time of the 2013 update to this *Plan*.

The development of carefully sited, well-designed New Growth Areas is an innovative means by which the Juneau residents can have the advantages of rural living and urban amenities. Large amounts of land in single ownership facilitate such development.

POLICY 3.4. TO ENCOURAGE AND FACILITATE THE DEVELOPMENT OF NEW GROWTH AR SUITABLE LOCATIONS IN THE REMOTE AREAS OF THE BOROUGH IN ORDER TO ACCOMMODATE MASTER PLANNED, SELF-CONTAINED URBAN-LEVEL DEVELOPMENT OPPORTUNITIES OUTSIDE THE URBAN SERVICE AREA.

Development Guidelines

3.4 - DG1 New Growth Areas are to be remote, self-contained communities that reflect an urban density yet are located a great distance from the Urban Service Area. The gross density should reflect a minimum residential density of ten dwelling units per acre; this can be reflected in a mixture of housing types and densities such as clustered housing and rural, low density housing over the course of the total residentially-designated lands.

3.4 - DG2 Require that each New Growth Area be developed according to a unified, comprehensive plan or master development plan that ensures the:

A. Use of energy-efficient siting, design, and construction techniques;

B. Efficient provision of sanitary sewer, water, storm water drainage and roads based on a sufficient population to support these services;

C. Preservation of natural vegetation, watersheds, public vistas, and other natural amenities;

D. Provision of passive and active recreational activities, including water access, open space/natural areas, community recreational facilities, and pedestrian and bicycle paths; and

E. Elimination of land use conflicts. This is particularly important in developments that combine residential and resource extraction, processing and transport uses.

3.4 - DG3 When preparing master plans or development plans for designated New Growth Areas or when considering designating New Growth Areas, identify and establish the following design and development parameters:

A. Physical assets and amenities, including views, natural vegetation, topography, water access, etc.;

B. Physical suitability, including potable water, soils, slopes, drainage, climate, prevailing winds, hazard areas, etc.;

C. Potential natural resource conflicts, including fish and wildlife habitats, wetlands, groundwater supplies, commercially-valuable mineral and timber resources, etc.;

D. Size/configuration of the land to be developed, assuming compact residential development representing a minimum residential density of ten units per gross acre of residentially-developed land or land within a mixed use district;

E. Ownership patterns;

F. Proximity to commercial and employment centers;

G. Costs of extending roads and public transport to and through the area, and of providing utilities, community water, sewer, and storm drainage;

H. Market demand and financial feasibility studies conducted by the CBJ government or private developers;

I. CBJ government disposition/development strategies for lands under its c… current usage of the site; and,

J. Subsistence or recreational use conflicts.

3.4 - DG4 Require developers, including the CBJ goverment, to demonstrate economic feasibility and market demand for the proposed development if public lands and/or investments are involved. Determine the pertinent feasibility information, including demographic characteristics, economic conditions, amenities and growth potential of the community prior to permitting development of New Growth Areas.

3.4 - DG5 Identify and require assurances of adequate road corridors and potential mass-transit service for New Growth Areas prior to permitting development.

3.4 - DG6 Allow for phasing of the development that permits construction in reasonable increments within an overall master plan or planned unit development design concept.

3.4 - DG7 Require developers to post bonds, if necessary, to assure that required improvements for the project are completed within a specified timetable and in substantial compliance with the approved development plan.

Implementing Actions

3.4 - IA1 Update the New Growth Area section of the Land Use Code to provide flexibility for developing each individual New Growth Area to include all the implementing measures recommended in this *Comprehensive Plan*. Establish minimum open space/natural areas, recreational and landscaping requirements, providing flexibility to allow consideration of new data, conditions, and analysis. Provide minimum standards for roadways and bicycle and pedestrian paths assuring a Level of Service D or better.

3.4 - IA2 Revise the Land Use Code to require a demonstration from the developer of a New Growth Area that the number of residential units proposed therein will be sufficient to create a viable community and support the efficient and cost-effective provision of roads and utilities such as community-level water, sewer, and drainage systems. The acreage required will be based in part on assuming a minimum average urban density of ten dwelling units per gross acre; this will allow flexibility in providing high density housing clustered around a village center as well as suburban densities outside of the core residential area(s). Additional acreage to accommodate undisturbed fish and wildlife corridors and buffer zones, open space/natural areas, future expansion, recreational, public and commercial uses may be required.

3.4 - IA3 Establish policies and procedures for classifications, management and disposal of CBJ-owned lands in New Growth Areas, through the use, in part, of the Lands Management Ordinance (CBJ 53.09).

CHAPER 4
HOUSING ELEMENT

Introduction

Like many communities across the country, Juneau residents are suffering from a housing crisis: There is an inadequate supply of housing to provide residents adequate choice in housing size, location and price, resulting in residents paying more than 30% of their income on housing.

The conventional public policy indicator of housing affordability in the United States is the percent of income spent on housing. The National Housing Act of 1937 considered households "burdened" if expenditures toward housing exceeded 30 percent of gross household income. This affordability indicator can be applied to any person at any income level in any type of housing unit.

The three indicators of a housing crisis are the presence of households that (1) are paying more than 30% of their household income for shelter, thereby deemed "overburdened" by housing costs; (2) live in overcrowded conditions, that is, more than one person per room within the home; and/or (3) live in unsafe and/or unsanitary housing units, that is, without a full kitchen and bath. The 2008 American Community Survey by the U.S Census reports that nearly 4,000 of the 12,187 Juneau households spent more than 30% of their household incomes on household costs in 2008. This includes 1,350 households that spent more than 50% of their incomes on household costs. According to the 2010 *CBJ Housing Needs Assessment* report by the Juneau Economic Development Council (JEDC), 38% of Juneau renters and 39% of homeowners do not have affordable housing.

Unmet housing need in the community can be measured by a number of criteria, including the number of:

- persons who are homeless;
- persons living in unsanitary housing, that is, without a full kitchen and/or bathroom facility;
- persons with specialized needs living in inadequate housing with regard to physical accessibility;
- persons who cannot live independently without needed support services such as life care or counseling; and/or
- households paying more than 30% of their gross income on shelter costs.

Housing Demand and Affordability

One of the most effective indicators of housing choice is the vacancy rate of each housing type in the community's inventory. A 5% vacancy rate for each type of housing *need* is generally deemed an indicator that there is adequate choice in the type, size and price of housing. In the City and Borough of Juneau, however, a vacancy rate of 5% or more has only been reached during times of economic downturn. The community achieved and exceeded this 5% vacancy rate threshold in its inventory of *single-family homes* from 1986 through 1989, in its *mobile home/ manufactured home* inventory in 1986 and 1987, and in its *apartment/condo* inventory from 1985 through 1988 and has not experienced it since that period. A 5% vacancy rate is not a healthy vacancy rate for all housing types, although it may be a healthy rate for multi-family residences. In 2010 the five year average of single-family vacancy rates was 1.4%. According the US Census American Community Survey, Juneau's rental vacancy rate in 2008 was

2.3%. The Alaska Department of Labor reports the 2012 overall vacancy rate to be 3.2%. This is an impr from the 2007 vacancy rate for single family homes of 0.86% and 3.13% for multi-family buildings.

Practically speaking, a one percent vacancy rate is equivalent to zero availability of housing and demonstrates a critical housing shortage. This most often results in overcrowding and overpayment. Overpayment is when residents pay more than 30% of their income for housing that is too small to accommodate their household size. Residents who are not able to find or afford housing that fits their household size or budget, and are situated in less accommodating units represent a pent up demand for housing that suits their needs.

The 2010 *Juneau Housing Needs Inventory* measures pent up demand (current need) to achieve a 5% vacancy rate by housing category. According to those calculations, Juneau needs 343 more housing units to meet pent-up demand, including 208 single family homes and 138 more housing units in multi-unit buildings (duplex to apartment buildings).

Juneau has several distinctive housing needs that many other communities do not have. These are Legislative Session workers, Tourism/Fishing Season workers as well as members of the Coast Guard and their families.

During the 90 day legislative session lawmakers, staff and lobbyists require housing. In 2010 there were 185 out of town legislators and staff. In 2008 the average annual number of summer seasonal employees (both full and part time) in Juneau was 2,230. A report by the McDowell Group estimated the peak summer employment in 2008 to be just over 3,000. Using these numbers, one can estimate that there are almost 800 summer seasonal workers in Juneau, many of whom require housing. In August of 2012 the U.S Coast Guard had 253 active duty members in Juneau, 73.5% of which have families. All U.S. Coast Guard active duty members working in Juneau have come from outside Juneau. A tour length is four years.

SIX YEARS VACANCY RATES

Unit Type	2007	2008	2009	2010	2011	2012	Average
Eff.	3.0%	4.4%	10.3%	11.9%	1.6%	1.6%	5.4%
1 Bdrm.	1.6%	4.7%	3.6%	3.5%	2.5%	0.6%	2.8%
2 Bdrm.	4.6%	5.2%	5.0%	2.5%	3.8%	3.3%	4.1%
3 Bdrm.	6.4%	5.2%	9.4%	4.0%	2.1%	2.4%	4.9%
Single Family							
1 Bdrm.	3.4%	8.1%	12.9%	0.0%	6.1%	3.8%	5.7%
2 Bdrm.	11.1%	10.7%	7.7%	7.1%	9.5%	14.3%	10.1%
3 Bdrm.	8.0%	6.3%	6.5%	0.0%	3.7%	9.1%	5.6%
4 Bdrm.	N/A	22.2%	0.0%	0.0%	0.0%	12.5%	6.9%

Source: AHFC & AKDOL

Table 4.1

Homelessness

The CBJ accepts and uses the Housing and Urban Development (HUD) definition of Homeless. HUD defines homeless in four broad categories:

- People who are living in a place not meant for human habitation, in emergency shelter, in transitional housing, or exiting an institution where they temporarily resided.
- People who are losing their primary nighttime residence, which may include a hotel or motel within 14 days and lack the resources to remain in housing.
- Families with children or unaccompanied youth who are unstably housed and likely to remain in that state.

- People who are fleeing or attempting to flee domestic violence, have no other reside
  resources to obtain other permanent housing.

CBJ participates in the annual Point In Time Homeless (PIT) count which is a Department of Housing and Urban Development requirement.The PIT count is organized statewide through the Alaska Housing Finance Corporation (AHFC). Survey forms are distributed to local emergency shelters, transitional and permanent supportive housing programs, and social service agencies (e.g. schools, hospitals, clinics, mental/behavioral health agencies) that interact with the homeless population on the day of the PIT count. In recent years, the Juneau Homeless Coalition has organized Project Homeless Connect events at Centennial Hall with the goals of 1) having more engagement with the homeless population on the day of the PIT count and 2) to provide on-site assistance and services. The PIT count typically takes place the last week of January.

In 2011 and again in 2012, the offical PIT Count for the City and Bureau of Juneau was 562 persons. 178 were also participants in the 2011 Project Homeless Connect. At the 2012 Project Homeless Connect event 187 homeless persons participated and were surveyed.

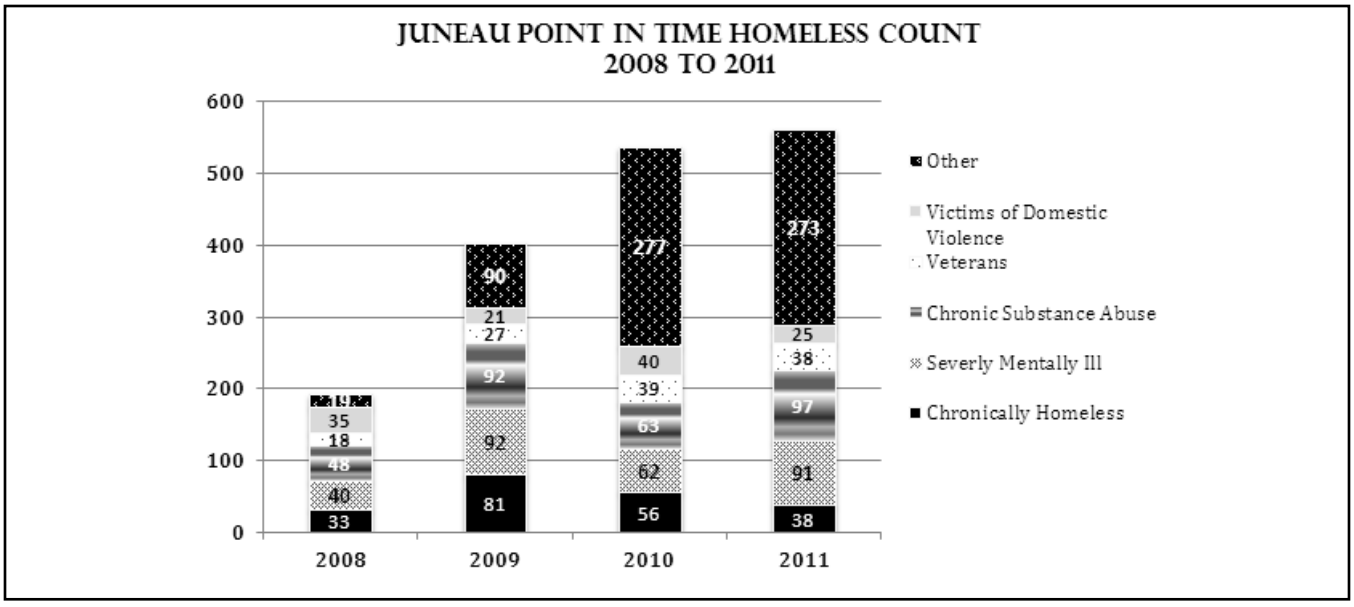


Figure 4.1

Despite focused attention to engage with the local homeless population through the provision of services, the PIT Count, and the Project Homeless Connect event, the Juneau Homeless Coalition understood that the most vulnerable homeless – those with extended length of time spent living on the streets, severe mental illness, substance abuse issues, or physical health issues- were not being accounted for or assisted.

In January 2012, the Juneau Homeless Coalition joined the 100,000 Homes Campaign to utilize tools to help house the most long-term and vulnerable homeless people in the nation. In March 2012, volunteers and Coalition members canvassed Juneau in the early morning hours to make contact with homeless people where they stayed, to deliver basic food and amenities, and to complete surveys. Of the approximate 500+ homeless Juneau citizens, approximately 8-10% are considered vulnerable based on these outreach efforts.

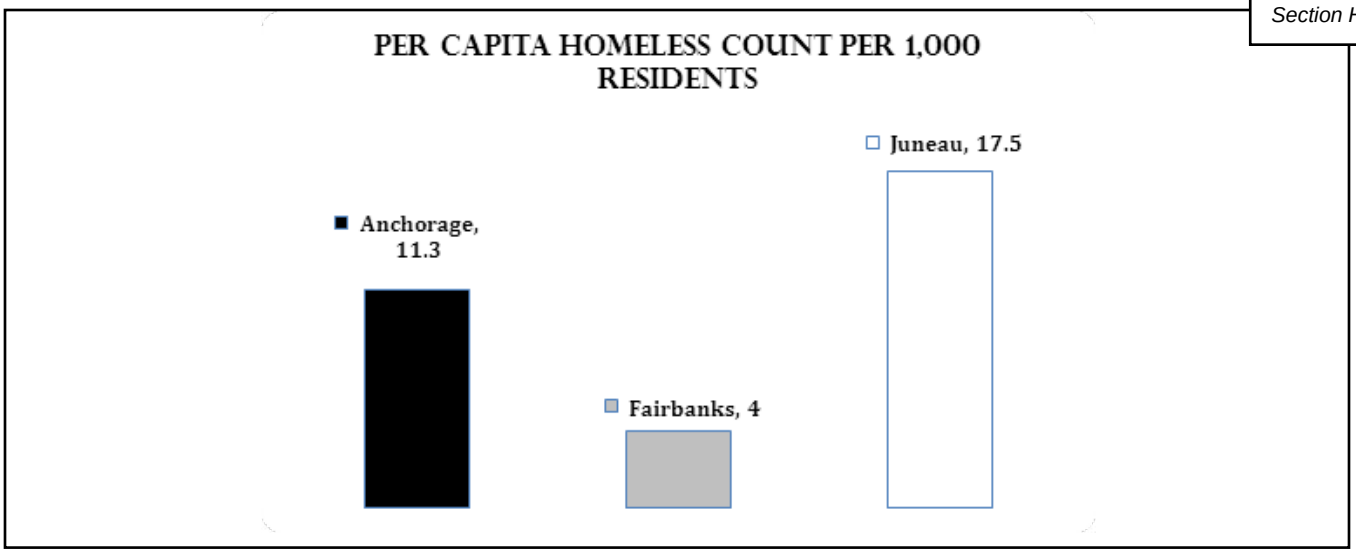


Figure 4.2

Housing Need

Juneau households live in single-family detached and attached homes, accessory apartments, condominium units, two- to four-plex structures, apartments, mobile homes on lots or in parks, group homes or congregate housing units with support services, extended stay hotels and motels, RV parks, float homes and boats, and campgrounds. A variety of dwelling unit types and sizes need to be provided throughout the borough, but particularly within the roaded area. Due to the cost of land and construction, small unit sizes and high density developments located within the area served by sewers are needed in order to achieve affordability.

In 2010, the average assessed value of a single family home was $325,711. The average rental rate for a 2-bedroom unit was $1,155 with a vacancy rate of 2.5%. Additionally, the average monthly cost of home heating oil for a 1,000 square foot home was $300 and the average monthly electric energy cost for that unit was $80. Shelter costs (e.g. rent/mortgage, utilities, maintenance, and taxes) can easily exceed 50% of a household's gross income, leaving very little income for food, clothing, transportation, medical care and other living expenses.

Affordability

Affordable Housing is defined by the Department of Housing and Urban Development using the following categories: a moderate income is a household that does not exceed 80% of the annual income of the Area Median Income (AMI); low income is a household that does not exceed 60% of the AMI; and very low income is a household with an annual income that does not exceed 30%.

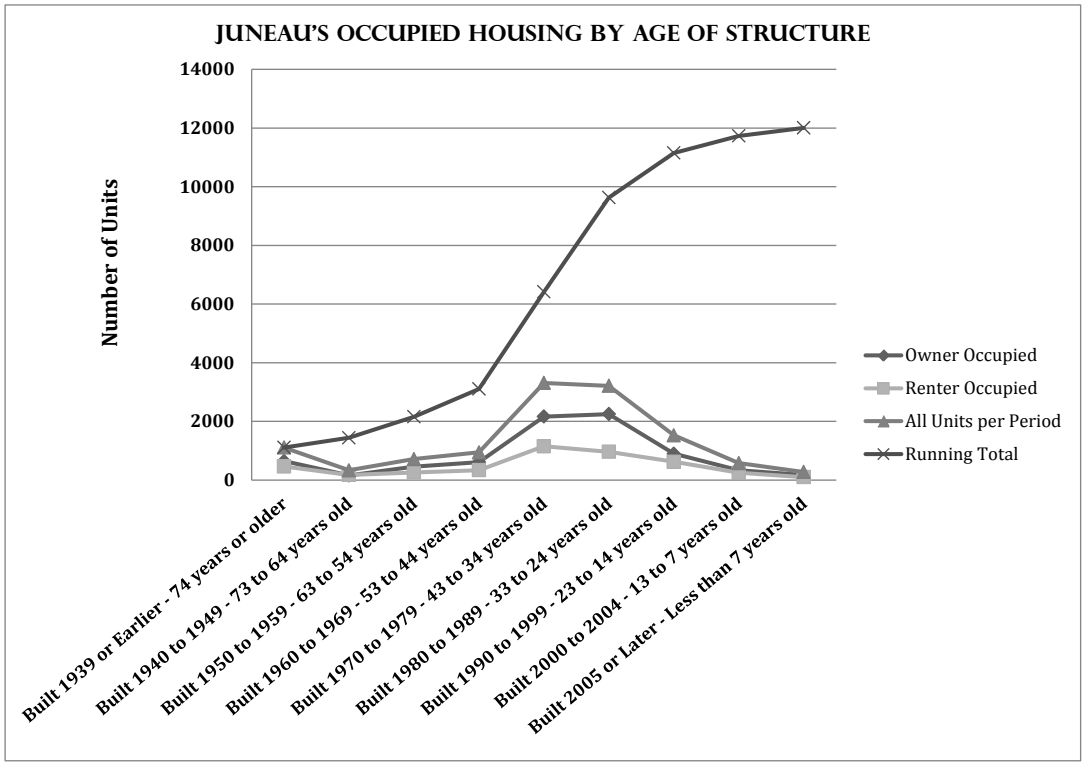
Juneau defines "workforce housing" as housing that is affordable to households whose annual income is between 50 and 120 percent of the AMI. Households earning more than 60% of the AMI have not traditionally qualified for low-income housing subsidies. As a result, many communities have a shortage of housing units, either for rent or for sale, in the "work-force housing" price range. Workforce housing expands the income range of affordable housing and targets "service workers" or "essential workers" like police officers, nurses, teachers, etc. Workforce housing can be included as part of the overall affordable housing stock but also includes fair market options such as rental units, homeownership or other programs such as first-time homebuyer programs or the Housing Trust model.

Federal and State funding for affordable housing oftentimes does not cover "workforce housing" initiatives as its upper limits is 80% AMI and with dwindling federal resources the targets are usually lower than 60%. Therefore most workforce housing strategies have to be developed locally using tools such as inclusionary zoning and density bonuses to create the desired results.

According to the 2010 *Housing Needs Assessment*, a State employee earning an average salary of $48,571 cannot afford the average rent for a two bedroom apartment. The Alaska Department of Labor reports that it takes 1.6 Juneau wage earners to qualify for a 30-year mortgage with an average interest rate and a 15 percent down payment for the average home price.

Existing Housing Stock

According to 2000 Census data, 83% of the total year 2000 housing units were built from 1960 to March 2000. Only 17% of the residential units were 60 years or older. This is generally considered "sound" housing stock.



Source: U.S. Census Bureau, American Community Survey Data, 2006 to 2010 annual average.

Figure 4.3

During the 1990s, housing starts did not keep up with population growth as shown in the table below. In the period from 2000 through 2006, 628 new dwelling units were built, representing a rate of less than 90 units per year. Between 2006 through 2010, 203 new dwelling units were built, representing 41 units per year. This *Comprehensive Plan* anticipates a 1% annual population and economic growth rate over the 20-year planning horizon, to the year 2033. The 2010 *Housing Needs Assessment* reports that Juneau needs 39 new housing units to accommodate every 100 additional residents.

HOUSING AND POPULATION GROWTH TRENDS, 1970 TO 2010

Census Year	*Population*	*# change from Previous Decade*	*% change from Previous Decade*	*Housing Units*	*# change from Previous Decade*	*% change from Previous Decade*
1970	13,556			4,529		
1980	19,528	5,972	44%	7,656	3,127	69%
1990	26,751	7,223	37%	10,638	2,982	39%
2000	30,711	3,960	15%	11,543	905	8%
2006	30,737	26*	0%*	12,771	1,228*	11%*
2007	30,134	-603†	-2%†			
2008	30,554	420†	1%†			
2009	30,946	392†	1%†			
2010	31,275	329†	1%, 1%†	12,974	1,431	11.5%

*Change in six-year period from 2000 to 2006 †Change from previous year
Source: U.S. Census

Table 4.2

Juneau's stock of mobile homes and manufactured homes are, on average, 33 years old. Today, a pre-1976 "mobile home" should be considered functionally obsolete unless it has been rehabilitated to meet the HUD fire safety standards. Manufactured homes (post 1976) that are well-maintained to assure waterproofing and prevention of mold growth can be expected to be safe and habitable housing for 30 years.

Mobile and manufactured homes that have reached or exceeded their functional life are of concern, particularly in Juneau's weather conditions. Mobile and manufactured homes are an important element in the community's affordable housing stock and care should be taken to ensure that they are well-maintained or, if beyond their functional and economic life, they should be replaced with similarly affordable units. In some cases, whole neighborhoods of mobile and manufactured homes may be in need of major rehabilitation or redevelopment.

Census data does not reveal whether or not housing has been well maintained. In a climate such as ours, it is very important that the roof and siding are maintained in good condition. A random sampling of single-family homes in the five neighborhoods with the lowest per capita income, according to the 2000 Census, resulted in a finding that the older homes therein were in sound condition and had received replacement roofs, and some upgraded plumbing and electrical elements. Deferred maintenance can result in the incremental deterioration to a condition that is no longer economical to repair and, eventually, the unit would be torn down to make way for a new unit on the property. Over time, a significant number of small, older, and relatively more affordable homes could be lost to deferred maintenance and substantial deterioration.

In the year 2000, 70% of the housing units were heated by fuel oil. Only 1.2% of the units were deemed to be lacking in complete plumbing facilities and 0.9% lacked complete kitchen facilities; both are indicators of substandard housing. At least 98% of the community's housing stock can be deemed in good and sanitary condition with regard to the presence of cooking and bathing facilities.

Assisted-Housing Inventory

The 2010 Juneau Housing Needs Assessment reports that in Juneau there are 800 housing units that are specifically designed as low-income housing units. These tenants are not required to pay market rate. Additionally, there are 337 housing vouchers used by low-income families that are not unit specific. An estimated 220 vouchers are used in market rate units. Only 1,020 of 11,740 units (9%) were available for low-income special needs, and homeless populations. In order to reach a target of 10% of units available to low-income and special needs renters Juneau needs 194 new units of low-income special needs housing.

It is reported by service providers to special needs residents that very few rental dwellings in the community are accessible to persons in wheelchairs or who use walkers and need universal design accessibility or design for visitability. Universal design concepts should be incorporated into all new ground-floor dwelling units.

Juneau's population is aging. Many older homeowners own their home outright and wish to age in place. These homes may need changes to adapt them to the requirements of the aging population.

JUNEAU LOW INCOME HOUSING UNITS, 2010

Low Income Housing Program	*Total Unique Units*
Low Income Housing Tax Credit Unit	344
AHFC Public Housing Program	207
Section 8 Project Based Contract Program	170
HUD 202 Supportive Housing for the Elderly	24
HUD 811 Supportive Housing for Persons with Disabilities	16
USDA Section 515 Rural Rental Housing Program	39
Housing Choice Vouchers not used in above units	220
Total of affordable units (including vouchers)	1020

* Reach Inc. has 9 HUD 811 units that are expected to open June 2010.

* Juneau Housing Trust has 3 permanently affordable single-family housing units planned.

Table 4.3

Loss of Housing

The loss of housing in Juneau is a difficult problem to quantify. However, there are a variety of reasons that contribute to the loss of housing.

Business operators throughout the community have expressed a need for affordable housing for their employees. This is true for businesses who offer year-round, full-time employment as well as summer season, tourist-related businesses. However, a number of summer season business operators have purchased multi-family housing structures for their seasonal employees and choose to keep these units vacant off-season. Such loss of year-round housing places additional burden on residents seeking rental housing.

Conversions of year-round rental housing to condominium ownership further reduces the number of rental housing units on the market. Rental housing is the most difficult to produce and finance and very few new rental units have been built in recent years.

Lastly, a number of structures in downtown Juneau have dwelling units that have been vacated by the owner and are being kept off the market; that is, the owners have abandoned the units and/or are keeping them vacant and allowing the facilities to deteriorate. There is no law or regulation that prevents owners from going out of business as a residential landlord and there is no easy way for the CBJ government to prevent the incremental deterioration of these units. The loss of safe and habitable rental dwelling units within the compact downtown due to owner disinterest is damaging to the community's housing stock and contributes to the housing crisis as well as to the blight of downtown Juneau.

Abandoned dwellings and deteriorating dwellings in the Downtown Historic District and nearby older, historic neighborhoods threaten the health, safety and well-being of those neighborhoods. As property owners defer maintenance and avoid investments in their properties, the structures thereon deteriorate and adjacent properties may become more vulnerable to fire and vandalism due to the presence of the attractive nuisance of an abandoned building. Securing financing for normal maintenance and repair of the neighborhood's occupied dwellings becomes more costly to the homeowner due to the financial institution's perception of blight associated with the near

abandoned building. Unless and until the community achieves a healthy vacancy rate, all habitable dwel valued and needed and uninhabitable units should be rehabilitated or replaced.

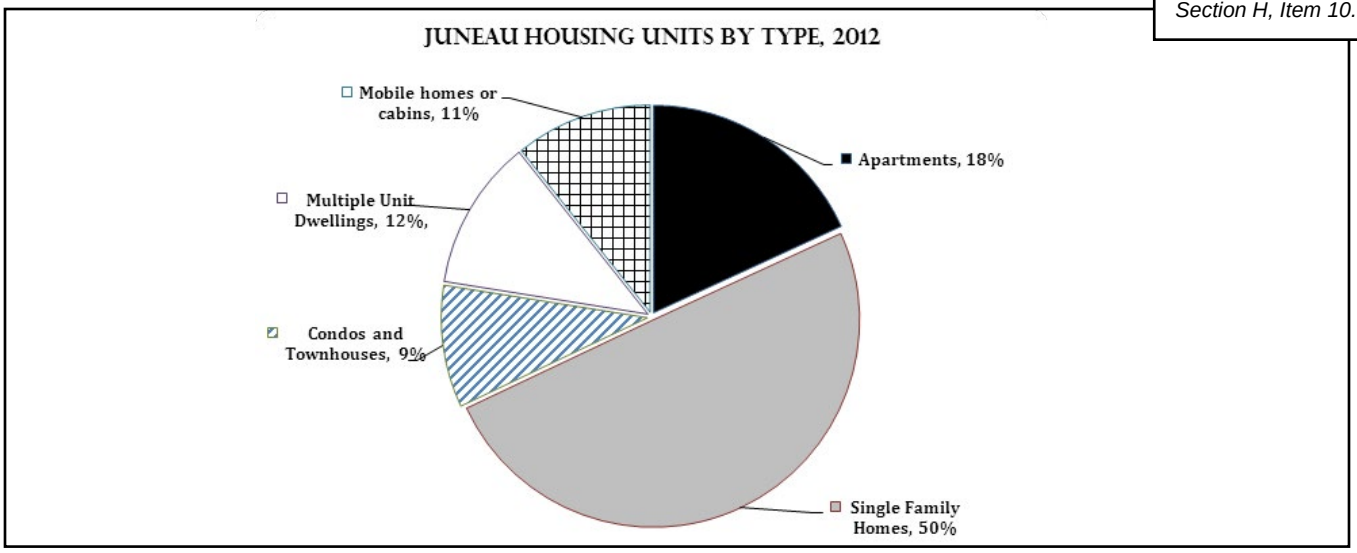
JUNEAU HOUSING BY TYPE OF HOUSING UNIT, COMPARISON BETWEEN 2010 AND 2012

Housing Unit Type	*2010*	*2012*	*Change*
Apartments	2,309	2,319	10
Apartments (Low Income Tax Credit)	344	344	0
Apartments	1,310	1,312	2
Apartment (in a residence)+	655	663	8
Single Family Homes	6,349	6,367	18
Single Family Residence	4,842	4,852	10
Zero lot line	852	852	0
Single Family Residence (with apt.)+	655	663	8
Condos and Townhouses	1,190	1,216	26
Condo	1,013	1,039	26
Townhouse	177	177	0
Multiple Units	1,464	1,500	36
Duplex Units	571	568	-3
Triplex Units	144	141	-3
Fourplex Units	404	432	28
Multiple buildings on property	345	359	14
Mobile home or cabin	1,381	1,372	-9
Mobile home on lot	242	237	-5
Mobile home in park	974	972	-2
Cabin	165	163	-2
Total Units	12,038	12,111	73

Source: City and Borough of Juneau, Property Tax Assessor's Database. Compiled by JEDC. *The Juneau Housing Needs Assessment Report completed for 2010 had an overcount of about 281 housing units in the Multiple Buildings on Property category. This report has corrected that overcount.

+ The Juneau Housing Needs Assessment Report counts apartments in single family dwellings twice by type - first as apartments and again as single family dwellings. Total Units are adjusted to account for this double count.

Table 4.4



Source: City and Borough of Juneau, Property Tax Assessor's Database. Compiled by JEDC.

Figure 4.4

Adequate Supply of Land for Housing

The City and Borough of Juneau encompasses 3,248 square miles, of which 1,616 square miles are land, 928 are icefield and 704 are water. Of the land area, approximately 14,956 acres are zoned for residential use, of which approximately 8,900 acres are vacant, representing 60 percent of all residentially-zoned land in the city and borough. However, in 2008, only 1,315 acres were zoned for densities of 10 residential units per acre (or greater, which is the minimum density needed to produce housing affordable to moderate to lower-income households. Of these 1,315 acres, 484 acres were vacant, representing 40% of the land zoned for moderately high density residential development. Subsequent up-zonings of residential areas on Pederson Hill and along North Douglas Highway, as well as changes to density limits in the Land Use Code, have increased the amount of land allowed to be developed at ten units per acre or more. It would appear that there is sufficient vacant land designated at densities that can produce affordable housing.

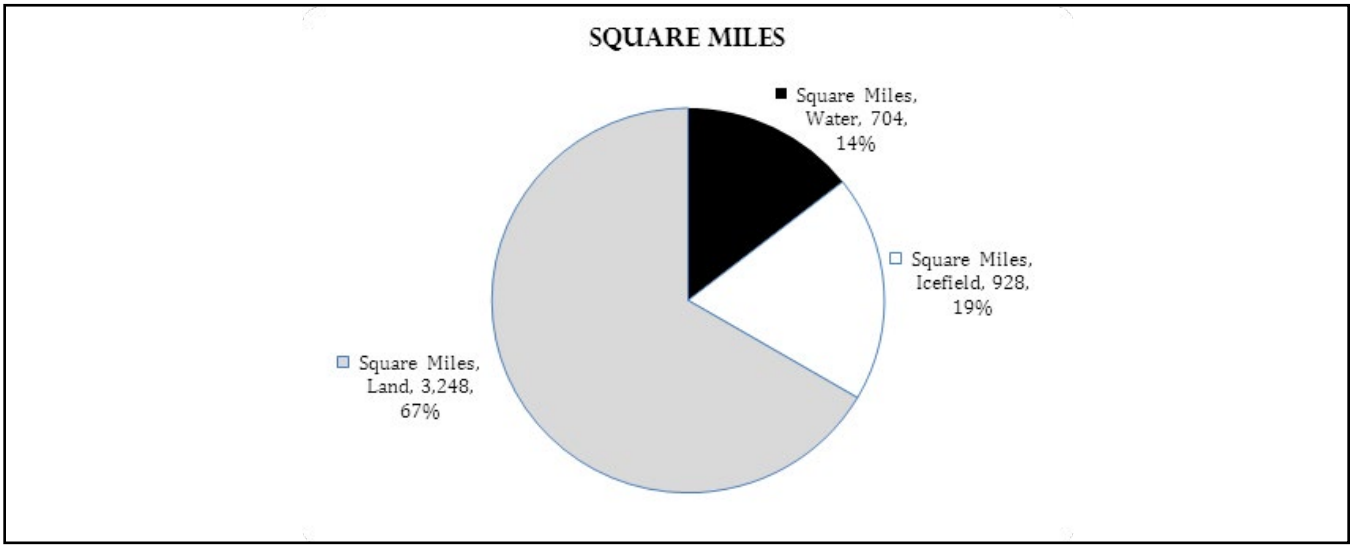


Figure 4.5

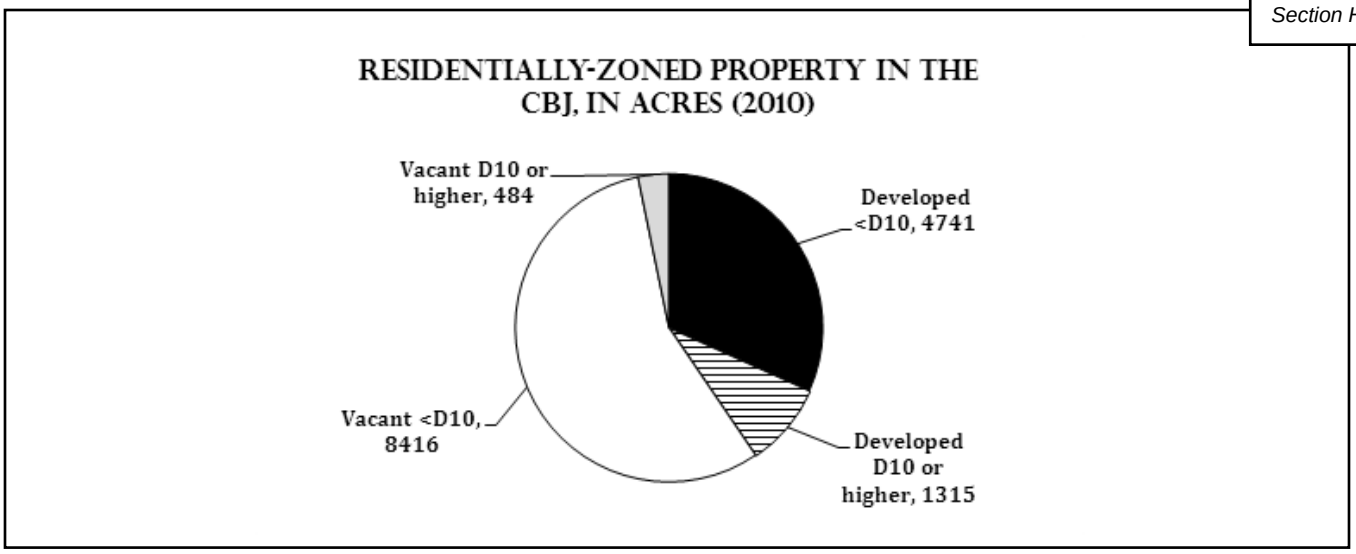


Figure 4.6

This leads to two questions: first, why is that land still vacant; and second, how can the CBJ government induce owners to develop it?

In 2006, the CBJ government embarked on an investigation to find buildable lands within the area that is provided municipal water and sewer service and that can have roads extended to the property. The study focused on vacant lands located within or near the Urban Service Area Boundary (USAB) and to which municipal sewer service could be extended within a 20-year planning horizon. The CBJ Community Development Department (CDD) looked at vacant and underutilized lands within the USAB that were one-quarter acre or more in size. An underutilized parcel is one with a structure or other improvement that is assessed at $50,000 or less by the CBJ Assessor.

That query found 847 vacant or underutilized parcels of a quarter-acre or more in size within the USAB; of these, 119 are CBJ-owned. Eliminated from consideration as buildable sites were CBJ-owned parcels that were designated for parks, open space/natural areas or greenbelts and parcels zoned for commercial, industrial or waterfront commercial uses. Thirty-one (31) CBJ-owned parcels were reviewed for consideration and were analyzed for proximity to access roads, steep slopes, airport flight safety hazards and avalanche and mass-wasting hazard potential. It was determined that parcels that were predominantly steeply sloped would not be suitable for affordable housing due to the increased engineering costs associated with providing access and building pads. Of the 31 potential parcels, 12 sites qualified as CBJ-owned buildable sites that were the subject of on-site reconnaissance for land use suitability and wetlands evaluation and delineation.

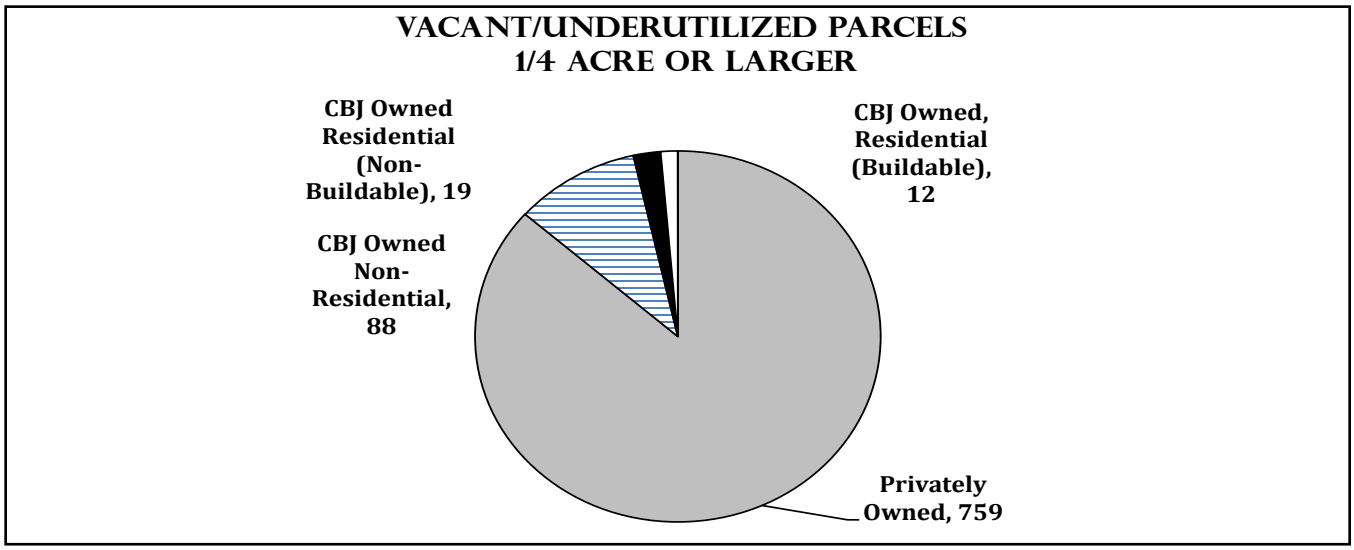


Figure 4.7

CBJ-OWNED LAND WITHIN THE URBAN SERVICE AREA

Site No.	*Location*	*CBJ owned parcel size, in acres*	*Approximate amount of percent of buildable* land area*
1	Switzer Creek/Lemon Creek	739; includes land around Dzantik'i Heeni Middle School	100 acres; less than 30 acres for new elementary school and covered playground. Need to replace trails: Total about 60 acres available for residential development.
2	Mendenhall Peninsula	676; excludes lands in Smugglers Cove and waterfront lands	15% or about 66 acres
3	North Douglas, north of Juneau-Douglas Bridge	654	10% or about 65 acres
4	Pederson Hill	443; less the greenbelt area from lake shore to ridge	15% or about 66 acres
5	Under Thunder Mountain	226	50% including the avalanche hazard area, only about 20% outside the hazard areas, or about 45 acres
6	Blueberry Hill, West Juneau	194	Less than 10%, or about 20 acres
7	Upper West Valley	180	Possibly 20%; need to cross wetlands to access approximately 36 acres
8	North Douglas; Fish Creek	90	90% or about 80 acres when sewer and roads are extended to areas outside the USAB
9	Crow Hill	32; less greenbelt area	Perhaps 10%, or about 3 acres.
10	Salmon Creek	24	None, too steep.
11	Lemon Creek industrial zone	16	None, Class A wetlands.
12	Salmon Creek	24	None, too steep.
Total estimated buildable land on CBJ sites:			450 acres
***Buildable land is less than 18% slopes and absence of Class A and B wetlands.**			

Table 4.5

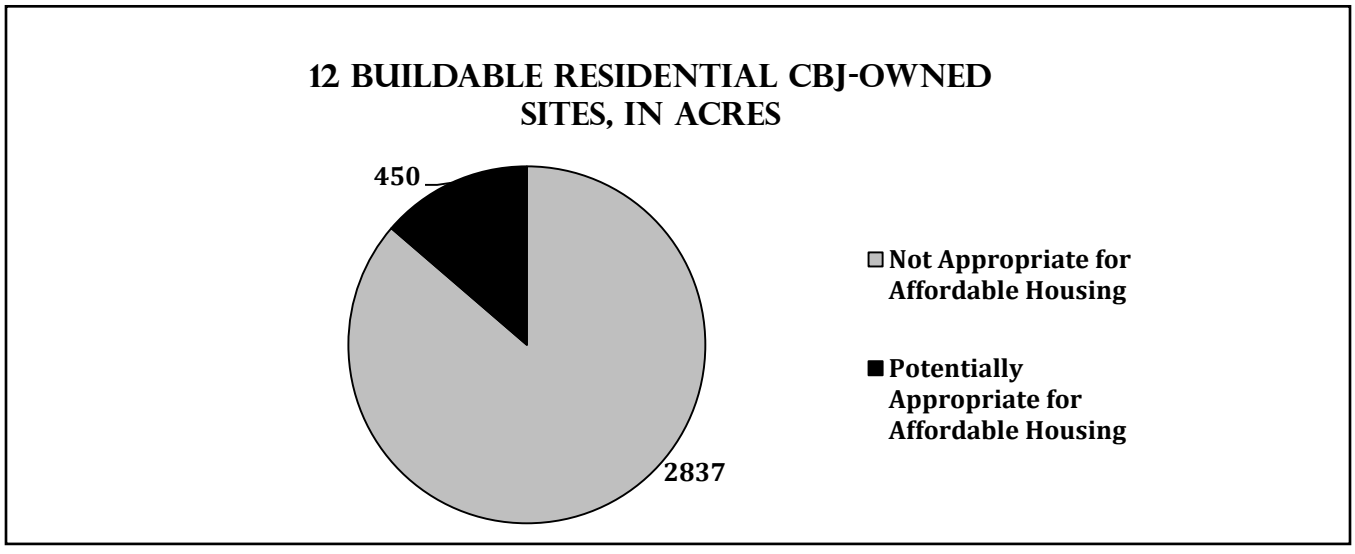


Figure 4.8

Of the 12 sites, only portions of four sites can be deemed suitable for development for affordable housing. It should be noted, however, that these sites are located on the edge of the USAB and will need roads and utilities extended to and through the property; some of the infrastructure will require bridges that cross anadromous fish streams and wetlands, all of which are costly. It is expected, therefore, that a large portion of the total units provided on the sites will need to be priced at market rates so that those units can internally subsidize the costs of bringing infrastructure to the development. It should also be noted that many of the arterial roadways that would serve these CBJ-owned buildable sites are already congested, experiencing Levels of Service (LOS) of D, E and F during peak commute periods.

Under a LOS D, several vehicles would be queued up at an intersection and the rear vehicle would require several minutes of delay before getting to pass through the intersection; this is, typically, considered by motorists to be "irritating." Under a LOS E scenario, there may be 10 to 20 vehicles queued up to enter an intersection and a motorist may wait two full traffic signal cycles before entering the intersection or, at an unsignalized intersection may wait up to 15 minutes before passing through an intersection; this is, typically, considered terribly annoying by motorists. Under a LOS F, which is often termed "gridlock," a motorist may wait several signal cycles before passing through the intersection and may be forced to turn around to find another route if seeking to turn left at an un-signalized intersection with a LOS F; this, typically, is considered unacceptable by motorists. By national planning standards, any Level of Service of D or worse is considered beyond the carrying capacity of the roadway and further traffic-generating land uses should not be routed through this roadway.

Only three of the 12 CBJ-owned buildable sites are in areas served by roadways with Levels of Service C or better; these three are located near the University on the Mendenhall Peninsula and east of Auke Lake on Pederson Hill. These three sites are also located within walking distance of existing public transit routes that can assist in reducing the parking requirements and resulting costs of development.

There are about 30 privately-owned vacant parcels within the USAB and within walking distance of public transit service; greater attention should be paid toward their efficient development for affordable housing. In the following section, this *Plan* suggests a number of strategies for inducing owners of those properties to develop them as high density, compact mixed use, or Transit Oriented Developments (TODs).

Housing Policies

The purpose of this section is to recommend policies that encourage adequate housing for all Juneau residents and to protect the character and livability of its neighborhoods.

As housing choice is influenced both by lifestyle and income, the CBJ government should encourage and facilitate the provision of a variety of affordable housing opportunities to its residents including: Single family detached and attached housing, condominiums, apartments, efficiency units or Single Room Occupancy (SRO) units, modular homes and manufactured homes, and float homes. Ensuring an adequate supply of rental housing, particularly for low-income residents, is also an important priority.

Other sections of the *Comprehensive Plan* addressing housing issues are found in Chapters 3 (Community Form), 8 (Transportation), 10 (Land Use), and 11 (Land Use Maps).

POLICY 4.1. TO FACILITATE THE PROVISION AND MAINTENANCE OF SAFE, SANITARY AND AFFORDABLE HOUSING FOR CBJ RESIDENTS.

Standard Operating Procedures

4.1 - SOP1 Fund, or assist in securing funding for, emergency shelters, transitional housing, permanent supportive housing, and appropriate supportive services for people who are homeless or near homeless or rent overburdened, particularly families and unaccompanied youth, and an increasing aging population.

Implementing Actions

4.1 – IA1 Develop a housing plan in order to further develop and facilitate affordable housing that encourages a diversity of housing types and densities.

4.1 – IA2 Support funding mechanisms that can create new rental housing, such as housing bonds, a local land and/or housing trust, or tax increment financing.

4.1 – IA3 Advocate for the use of federal Community Development Block Grant monies to be used to provide low interest housing rehabilitation loans.

4.1 – IA4 Investigate potential new financing strategies for new affordable housing development, such as a housing fund.

4.1 – IA5 Report, on an annual basis, the inventory of housing stock and vacancy rates in the CBJ, new housing permit review and construction activity, and any loss of housing due to demolition, abandonment and conversion of dwelling units to non-residential use or, to the extent possible, to track non-year-round occupancies.

4.1 – IA6 Support and encourage the Affordable Housing Commission to update the *Housing Needs Assessment* Report at least every five years and monitor change in housing conditions and assess whether policies, programs, guidelines and other mechanisms are achieving their objectives.

4.1 – IA7 Facilitate the provision of special needs and adaptive housing and supportive services in residential neighborhoods that are readily accessible to public transit, shopping, public amenities and supportive services.

4.1 – IA8 The CBJ government should participate with other local agencies in the federal program to prepare and adopt a "Ten Year Plan to End Homelessness" in the City and Borough of Juneau.

4.1 – IA9 Assist in the establishment and maintenance of an effective integrated client assessment and referral system for homeless and near-homeless residents that links all housing, medical and social service providers to develop greater efficiencies, client tracking and program funding and evaluation tools. [Please also see 13.3 - IA2]

4.1 – IA10 Develop a strategic plan to address dilapidated housing with incentives to either demolish or rehabilitate this housing, standards for evaluating degree of damage and potential for rehabilitation and mechanisms to encourage or force compliance for the public health and safety of CBJ citizens.

POLICY 4.2. TO FACILITATE THE PROVISION OF AN ADEQUATE SUPPLY OF VARIOUS HOUSING TYPES AND SIZES TO ACCOMMODATE PRESENT AND FUTURE HOUSING NEEDS FOR ALL ECONOMIC GROUPS.

Standard Operating Procedures

4.2 - SOP1 Designate on the Comprehensive Plan Land Use Maps adequate sites and supporting infrastructure within the Urban Service Area Boundary to accommodate a diversity of housing types, size, price and types of neighborhood scale and character to satisfy the desires of all residents.

4.2 - SOP2 The CBJ government should monitor the inventory of all types of housing and should focus efforts, funding and resources on producing the types of housing that have not yet reached a sufficient supply to meet demand.

4.2 - SOP3 The CBJ government should seek and facilitate new housing production, for all types, at an annual rate that mimics the growth rate of new households in Juneau, in order to maintain adequate choice of residence type, location, and cost.

4.2 - SOP4 Explore and develop methods to foster participation by private developers in the creation of affordable and workforce housing.

Implementing Actions

4.2 - IA1 Upgrade the CDD capability to track and monitor development activity and vacancy rates. Refine the CDD vacancy analysis, and its ability to estimate CBJ housing demand by type of housing. Track the impact of mining development and tourism on the housing stock and vacancy rate.

4.2 - IA2 Review planned unit development (PUD) provisions in the Land Use Code to ensure maximum opportunity for flexible siting, design, and construction of residential developments and amend the provisions as appropriate. Clustering of new structures and provision of mixed densities within each new subdivision should be encouraged.

4.2 - IA3 Conduct an inventory of dwelling units that are kept off the year-round rental market. The CBJ government should investigate incentives to encourage those property owners to rent those units year-round, particularly units suitable for students, workers or legislative staff.

4.2 - IA4 Investigate ways to encourage preservation of rental housing and avoid its conversion to transient housing or non-residential uses.

4.2 - IA5 Encourage the preservation, rehabilitation and year-round occupancy of downtown Juneau upper-level rental housing units in mixed use buildings.

4.2 - IA6 Support increasing the supply of low-income affordable rental housing by providing CBJ-owned land at discount prices to for-profit and non-profit housing developers who agree to utilize strategies such as: the development of mixed-income housing, with higher priced dwelling units subsidizing development costs for lower-priced units for low- and moderate-income households, or strategies such as land trust agreements.

4.2 - IA7 Provide needed infrastructure (e.g. water, sewer, roads), allow higher densities and, where appropriate, higher building heights for housing developments committed to providing affordable rental housing.

4.2 - IA8 Investigate the costs, benefits and implications to the local affordable housing market of adopting a new *Comprehensive Plan* policy to encourage new housing and major rehabilitation of existing housing to be designed with a wide doorway, at least one zero-step entrance, and a first-level bathroom that responds to Universal Design and Visitability principles. Exceptions to such a policy would be housing on parcels where terrain would not permit wheelchair accessibility.

4.2 - IA9 Create a program of seminars where private parties and developers can be trained in permitting procedures, and the CBJ building and development permitting process for all types of residential developments. Include in this program, when possible, training by staff from other relevant permitting agencies such as DEC, the U.S. Army Corps of Engineers (Corps), and ADOT&PF.

4.2 - IA10 Explore and implement methods to expand permanent housing options for “work force” housing.

POLICY 4.3. TO DESIGNATE ON LAND USE MAPS AN ADEQUATE SUPPLY OF BUILDABLE LAND WITHIN THE URBAN SERVICE AREA, AND PARTICULARLY ALONG TRANSIT CORRIDORS, FOR RESIDENTIAL USE AT DENSITIES THAT CAN PRODUCE HOUSING AFFORDABLE TO ALL ECONOMIC GROUPS.

Standard Operating Procedure

4.3 - SOP1 Monitor and, when necessary, designate an adequate amount of vacant land for residential development on the Comprehensive Plan Land Use Maps. Densities within the USAB and New Growth Areas should foster compact development at medium- to high-densities. As a target goal for compact development, a minimum density of ten dwelling units per acre for residentially-zoned lands within the USAB would make prudent and efficient use of these limited land resources. A density of 30 dwelling units per acre, or greater, along major transit corridors is recommended to produce affordable housing and to make efficient use of transit services therein.

Implementing Actions

4.3 - IA1 Amend the Title 49 Land Use Code to allow rezoning requests to medium-to-high density districts within the Urban Service Area to be requested by a property owner at any time of the year.

4.3 - IA2 Amend the Land Use Code to provide for an Affordable Housing Overlay District (AHOD) as a zoning map amendment that could lie upon any parcel located within the Urban Service Area. The AHOD would allow higher densities than the underlying zoning designation and may adjust development standards, where appropriate, for projects that include housing affordable to low-income households—Below Market Rate (BMR) units. [See "Bonus Eligible Area" in Chapter 11]

4.3 - IA3 Designate suitable land within one-quarter mile distance from public transit routes from Auke Bay to downtown Juneau as a Transit Oriented Corridor (TOC) overlay zoning district within which medium-to high-density housing in wholly residential or mixed use developments and with lesser parking requirements would be allowed. [See "Bonus Eligible Area" in Chapter 11]

4.3 - IA4 Encourage high-density Transit Oriented Developments and/or Mixed Use Developments in existing or new shopping centers and office parks.

POLICY 4.4. TO FACILITATE THE PRESERVATION AND REHABILITATION OF EXISTING HOUSING, PARTICULARLY HOUSING AFFORDABLE TO LOW- INCOME RESIDENTS.

Implementing Actions

4.4 - IA1 Report, on an annual basis, the inventory of housing stock and vacancy rates in the borough, new housing permit review and construction activity, and any loss of housing due to demolition, abandonment and conversion of dwelling units to non-residential use or, to the extent possible to track, to non-year-round occupancies.

4.4 - IA2 Adopt building and fire code standards for housing rehabilitation that are reasonable in cost and that continue to meet acceptable levels of public health and safety.

4.4 - IA3 The CBJ government should investigate ways to encourage property owners to maintain habitable rental dwelling units in residential use.

4.4 - IA4 Identify and inventory substandard housing, including pre-1976 mobile homes that do not comply with HUD standards of habitability, and pursue strategies to rehabilitate or replace these units with safe, sanitary, and HUD-compliant units.

4.4 - IA5 Improve the quality of housing and neighborhoods by educating landlords, tenants and property owners about health and safety code requirements, property maintenance Best Management Practices, and by enforcing code compliance when necessary.

4.4 - IA6 Identify and zone appropriate land areas within the USAB for new and/or replacement manufactured home parks or subdivisions.

4.4 - IA7 Subsidize residential rehabilitation through state and federal funds to conserve existing housing stock in established neighborhoods. When rehabilitating these units, incorporate appropriate features that address universal design/visitability principles. Depending upon the level of rehabilitation, these features could include wide doorways, at least a half bath on the main floor, accessible placement of electrical controls and at least one zero-step entrance to a building.

POLICY 4.5. TO MAINTAIN THE LONG-TERM AFFORDABILITY OF DWELLING UNITS DESIGNATED AFFORDABLE AS A CONDITION OF APPROVAL FOR THE GRANTING OF A REZONING, INCREASED BUILDING HEIGHT, REDUCED PARKING, OR OTHER ECONOMIC BENEFIT TO THE DEVELOPMENT PROJECT.

Implementing Action

4.5 - IA1 Pursue mechanisms for assuring affordability consistent with the findings associated with an inclusionary affordable housing study per 4.6 - IA3.

POLICY 4.6. TO FACILITATE AND ASSIST IN THE DEVELOPMENT OF AFFORDABLE HOUSING.

Development Guideline

4.6 - DG1 When designing a new affordable dwelling unit, take into consideration life cycle cost savings that consider the first costs of materials and equipment and the recurring operating costs related to home heating, energy consumption and the replacement of building elements such as siding, roofs and windows. Using quality materials and finishes will maximize performance and reduce replacement costs. Encourage compact development of multi-dwelling units to make extending utilities, roads and pathways less costly and to maximize the efficient use of buildable land. The location, orientation and design of each unit on the land should maximize daylight and privacy for occupants while facilitating a sense of community among all occupants of the development.

IMPLEMENTING ACTIONS

4.6 - IA1 Inventory, assess, and make available suitable CBJ-owned lands within the Urban Service Area to transfer to for-profit and/or non-profit residential development corporations that would result in new construction of low- and moderate-income affordable housing. Strategies may include development of mixed income housing with higher priced homes subsidizing lower-priced homes set-aside for low and moderate-income households. Strategies may also include land trades and land trust agreements.

4.6 - IA2 When feasible, provide property tax relief for housing developments that are owned and operated by non-profit corporations and in which the units are leased to senior (over the age of 65) and low-income households, provided these savings are passed-through to the tenants in the form of lower rental rates or housing costs.

4.6 - IA3 The CBJ government should conduct an analysis of inclusionary affordable housing zoning standards and requirements that could be suitable for application in the borough.

4.6 - IA4 Streamline the residential development permitting process. Coordinate the review of residential developments and affordable housing projects and provide continuity and timeliness in their review by all affected CBJ departments and divisions.

4.6 - IA5 Investigate the feasibility of reducing permit fees for dwelling units designated as long-term affordable housing for low and moderate-income households.

POLICY 4.7. TO ENCOURAGE PRESERVATION OF RESIDENTIAL STRUCTURES THAT AR ARCHITECTURALLY AND/OR HISTORICALLY SIGNIFICANT TO THE CBJ AND WHICH CONTRIBUTE TO THE HISTORIC AND VISUAL CHARACTER AND IDENTITY OF THE NEIGHBORHOOD.

Implementing Actions

4.7 - IA1 Identify residential properties of historical significance using the *Downtown Historic District Development Plan* and other sources, seek public and private funding sources for rehabilitation of these properties, and assist owners in obtaining these funds.

4.7 - IA2 In developing new zoning or development standards in areas with concentrations of historic structures, ensure that relaxed standards, such as higher building heights, do not induce a property owner to demolish the historic structure in favor of a larger structure or development.

POLICY 4.8. TO BALANCE THE PROTECTION AND PRESERVATION OF THE CHARACTER AND QUALITY OF LIFE OF EXISTING NEIGHBORHOODS WITHIN THE URBAN SERVICE AREA WHILE PROVIDING OPPORTUNITIES FOR A MIXTURE OF NEW HOUSING TYPES.

Development Guideline

4.8 - DG1 When reviewing rezoning applications within the Urban Service Area, higher densities than are found on adjacent or surrounding properties should be deemed consistent and harmonious with the character of the neighborhood, provided that the overall scale and massing of the new development is compatible with the neighborhood and the siting and/or design of the new structure(s) assures the privacy, light and air of its neighbors. [Please also see 10.4 - DG1 and Policy 10.6 in Chapter 10]

CHAPTER 5
ECONOMIC DEVELOPMENT

Outlook for Economic Growth

Juneau is at an important juncture in its history, with changes to the population dispersion throughout the state increasing government and economic activity along the "rail belt," and especially in and near Anchorage. While Juneau has a primary strategy to maintain government-based public service employment, it has significant potential for development or expansion of its other basic industries (e.g. mining, fishing, seafood processing, forest products, tourism, small manufacturing, university education and research, regional services). In the service industry sector, in addition to normal expansion as the overall economy grows, Juneau has potential to replace more outside services and products with local suppliers (e.g. local professional services, construction services, food production, car sales, etc.). Although some growth in existing industries is expected, the continued diversification of Juneau's economic drivers will improve the economic sustainability of the community and the region. New and emerging industries such as the wood pellet and bio-fuel industries, renewable energy research, or industries with renewed interest in Juneau such as the film industry, should be encouraged and accommodated as long as their impacts are acceptable to the community.

Responsibility for Economic Development Activities in Juneau

In 1987 the Juneau Economic Development Council (JEDC) was incorporated as a nonprofit corportation, and in 1991 JEDC and the CBJ Assembly agreed that it would be appropriate for the JEDC board of directors to be appointed by the Assembly. Resolution 2063 sets seven goals for the JEDC, as well as designating the JEDC as the CBJ's Overall Economic Development Planning Committee and authorizing JEDC to prepare an Overall Economic Development Plan for the community. In general, the mission of the JEDC is to foster a healthy and sustainable economic climate in Juneau and throughout Southeast Alaska. In collaboration with other organizations, the council implements initiatives to maintain, expand, and create economic opportunities. The responsibilities for implementation of the policies in this Chapter are generally identified as either CBJ staff, or the JEDC.

Background: Previous Economic Development in Juneau

The economic circumstances of an area help determine the amount, rate, and type of land development; they also influence the demand for housing, public facilities, and services, and have a strong relationship to the overall quality of living. Over the last decade, economic development has been pursued publicly and privately. Private-sector efforts include the development and operation of precious metal mining; expansion of the seafood processing industry; development and expansion of local manufacturing of goods; development and expansion or retail and service industries; and a tremendous increase in tourism-related businesses. Public efforts include the expansion of the National Oceanic and Atmospheric Administration (NOAA) and University of Alaska facilities; continued program development by JEDC; upgrades and improvements to the waterfront and docks; upgrades to pedestrian and vehicle circulation throughout the community; the sale of CBJ-owned land for commercial and residential development; the continued extraction of gravel from CBJ-owned lands to support the development of road and utility infrastructure; a new Downtown Transportation Center; a new Mendenhall Valley High School (Thunder Mountain); new recreational facilities including upgraded ski lifts, the Dimond Park Aquatic Center, and covered play areas; extended public utility services and attendant up-zonings; expansion and upgrades at the Juneau International Airport; and the development of plans for projects that will be built in the near future, such as the state's Library, Archives, and Museum project and the CBJ Docks and Harbors' downtown cruise docks

expansion project, which will result in two new floating cruise ship docks that are both capable of accomm
1000 foot-long vessels.

The economy of the Juneau area developed originally to support mining activities. Since Juneau became the territorial Capital in 1906, there has been an increasing reliance on government as the major support for the local economy. Much of the City and Borough of Juneau's economic and population growth since Alaska became a state in 1959 occurred in large part as a result of state, federal and local government expansion. Juneau's economy today consists of a mix of public and private sector industries. Important private industry sectors include commercial fishing, mining, manufacturing, transportation services, financial and business services, visitor services, wholesale and retail trade, and the businesses that support these industries.

"Basic" and "Support" Industries

Economic sectors in the borough can be categorized as "basic" and "support." In a nutshell, the key difference between "basic" and "support' industries is that "basic" industry (like the manufacturing, mining, or state and federal government) brings "new" money and jobs into the community, while "support" industries (like grocery stores) largely depend on money that is already in the community.

Basic sector industries are those businesses that sell goods and services to customers from outside of Juneau, or, like state and federal government, brings new money and jobs into our community . All of these businesses or organizations create economic growth by bringing new jobs and money into Juneau. The bulk of basic sector employment in Juneau comes from mining, commercial fishing and fish processing, tourism, and state and federal government. Support sector industries earn revenue by providing goods and services to local residents, and create economic growth by keeping local money from leaving the community. These industries include retail and wholesale trade, medical and business services, construction, local government, and many others.

Some industries are a combination of basic and support sector depending on who purchases their goods and services. Juneau residents patronize local retail and service businesses. However, visitors to Juneau also shop and obtain services locally. In addition, Juneau's role as a regional center attracts residents of surrounding communities to Juneau to shop, and to obtain medical, financial, repair, transportation and other services, thereby bringing outside money into the community.

POLICY 5.1. TO DEVELOP AND SUSTAIN A DIVERSE ECONOMY, PROVIDING OPPORTUNITIES FOR EMPLOYMENT FOR ALL RESIDENTS.

Implementing Actions

5.1 – IA1 Work with private-sector industries and businesses and public sector agencies that are interested in locating or expanding within the City and Borough of Juneau, and consider offering land, tax incentives, or other benefits to encourage new development.

5.1 – IA2 The JEDC will monitor the impacts of economic drivers on the community and make recommendations for economic development action annually through its annual Economic Indicators analysis.

5.1 – IA3 Invest in developing and adopt an economic development plan for Juneau. Update the adopted economic development plan as needed to ensure that it reflects current economic indicators and trends and is responsive to changing economic situations.

5.1 – IA4 Create a CBJ government-supported marketing group with the mission of promoting Juneau as a location for business investment.

State Capital

Juneau's position as Alaska's state capital is not only a major source of identity for the community but represents its major economic activity; nearly half (47%) of the community's workforce is employed by the state, federal, and local government. Development of new facilities or replacement of existing structures necessary to accommodate the government-based public service workforce should be planned with careful coordination between state and local officials. This growth will have significant impacts on all other development within the borough, including

housing, transportation, public services, and cultural, commercial, and recreational activities. The local government must continue efforts to make Juneau as attractive and functional as possible to serve the special needs of a Capital City.

Other sections of the *Comprehensive Plan* address economic development issues; these are found in Chapters 4 (Housing), 15 (Cultural Arts Resources), 10 (Land Use), and 11 (Land Use Maps and Subarea Guidelines).

POLICY 5.2. THROUGH A COOPERATIVE EFFORT WITH THE STATE OF ALASKA, TO PLAN FOR AND SUPPORT DEVELOPMENT OF AN ATTRACTIVE SETTING, FACILITIES, AND OTHER SERVICES TO ENHANCE THE STATE CAPITAL AND TO STRIVE TO PROVIDE AN ATMOSPHERE CONDUCIVE TO GOOD LEADERSHIP IN THE STATE, ACCESSIBLE TO AND SUPPORTIVE OF ALL PEOPLE OF THE STATE OF ALASKA.

Standard Operating Procedures

5.2 - SOP1 Monitor and strengthen the health and well-being of the Capital City functions in the community and continue to seek improvements to meet the needs of legislators, their support staff and residents.

5.2 - SOP2 Support efforts to promote leadership and participation in legislative affairs by supporting affordable accessibility to the capital for all state residents.

5.2 - SOP3 Reach out to the residents of the rest of the state to ensure Juneau is seen as an effective location for, and a fair host of, the state capital.

Implementing Actions

5.2 - IA1 Initiate joint planning, with representatives of the state legislature and appropriate state agencies, for the Capitol Complex. The following issues should be discussed when siting and designing this complex:

A. Defining the physical boundaries of the state capitol planning area consisting of the capitol site and its surrounding sphere of influence;

B. Formulating a facilities plan that identifies the nature, timing, cost,

C. and local/state government roles and responsibilities for all needed improvements;

D. ntegrating new structures into the streetscape of the neighborhood, taking special care to preserve view corridors as well as the visual dominance and character of adjacent historic structures; and,

E. Ensuring that the new complex is universally accessible, pedestrian-friendly and is well-linked to public transit.

5.2 - IA2 Work collaboratively with and request federal agencies coordinate plans for expansion or modification of federal facilities in the downtown area with local and state plans for the Capitol Complex.

5.2 - IA3 Encourage coordinated or joint planning efforts to address the need for alternative transportation and parking opportunities for state workers and legislative personnel. All government agencies should participate in a coordinated Downtown Transportation Management Program per the elements described in Chapter 8 of this *Plan*. [see also 8.5 - IA6 and Subarea 6 Guideline and Consideration 13]

5.2 - IA4 Seek ways and means to encourage housing for legislative personnel, such as high-density housing along transit corridors, Single-Room Occupancy (SRO) dwellings downtown, and extended-stay hotels or other lodging in the downtown and around the airport, provided that this does not result in the net loss of year-round rental housing.

5.2 - IA5 Seek ways to expand state and federal workforce presence in Juneau.

5.2 - IA6 Assume a leadership role in the encouragement of transportation links into and out of the borough. Consider all affordable energy-efficient transport alternatives to improve transportation links between the Juneau and other areas of Southeast Alaska, including improved air passenger and cargo service, roadways, ferries, and fixed-guideway systems.

Federal Government

In addition to bringing state government functions to the community, Juneau's status as the state capital and regional hub also brings a federal government presence to Juneau. Federal courts and administrative offices at the Federal Building are augmented by a strong research, management, and enforcement presence by federal agencies such as the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish & Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Forest Service, Federal Aviation Administration (FAA), Immigration and Customs Enforcement (ICE), Transportation Security Administration (TSA), U.S. Army Corps of Engineers (Corps), Federal Bureau of Investigation (FBI), and U.S. Coast Guard (USCG). The USCG alone employed 363 staff in Juneau in 2011, and brings many more crew to Juneau for shorter periods of time.

POLICY 5.3. TO WORK COOPERATIVELY WITH FEDERAL AGENCIES TO ENSURE THAT EXISTING JOBS STAY IN JUNEAU, AND THAT AGENCIES HAVE ACCESS TO THE FACILITIES AND INFRASTRUCTURE REQUIRED TO SUPPORT THEIR MISSION IN JUNEAU.

Standard Operating Procedures

5.3 - SOP1 Work with the General Services Administration (GSA) and other federal agencies to ensure that federal facilities that exist or are planned in Juneau are provided with adequate urban services or other infrastructure as required.

5.3 – SOP2 Continue to support JEDC's efforts to bring federal government research programs to Alaska, and to Juneau in particular.

5.3 – SOP3 Work with the USCG to ensure that waterfront development facilitates their efforts to keep waters of the United States safe for navigation,

Implementing Action

5.3 - IA1 When research by federal agencies provides new insights into resource management, harnessing energy, or other applicable fields, respond quickly with amended CBJ ordinances and/or plans to show that the community and government support the work accomplished by federal agencies conducting work in Juneau.

5.3 – IA2 Continue to work on extending North Douglas Highway to a deep water port site on the west coast of Douglas Island, and on providing a northern crossing of Gastineau Channel, so as to better accommodate the United States Coast Guard and its mission in Southeast Alaska.

Regional Economics and Services

Juneau is Southeast Alaska's political, commercial, and transportation hub. There are many examples of regional economic interchange including:

- Regional participation at the University of Alaska Southeast;
- Commercial-retail shopping by outside residents;
- Regional marketing of special events;
- Regional participation in sporting and cultural events;
- Manufacture of goods for outlying communities;
- Supply and shipping for outlying resource development activities, some of which reach their final market in Juneau;

- Participation of the regional populace with state and federal agencies including the A Legislature;
- Alaska Native regional and village corporations based in Juneau do work throughout the region;
- Financial, insurance, medical, clerical, consulting, recreational, cultural, and communications services provided to residents of outlying communities;
- And as many others.

Transportation is particularly significant to the development of regional commerce as Juneau is accessible only by marine and air transport. Goods, customers and information rely on the ability to travel in and out of the community rapidly, safely, and at the lowest cost to achieve maximum participation.

Juneau has a unique and important role to play in helping the region achieve a successful future. Finding an equitable balance between the community's contribution to solving the region's problems and the benefits that the community will receive for participating in regional solutions has been an ongoing challenge. Only by fully participating in regional development planning efforts will the community see its economic development goals fulfilled. Clearly, both the community and the CBJ government have responsibilities and opportunities, as Juneau is a provider of regional services and a significant political, cultural, and economic presence in southeast Alaska.

The CBJ government should strengthen its regional planning and coordination efforts with municipalities and communities throughout the region and should work to offer residents of those communities ease in transport and accommodations when traveling here for legislative, judicial, medical care, sports and recreation, arts and entertainment, and shopping activities.

POLICY 5.4. TO ENCOURAGE AND SUPPORT REGIONAL ECONOMIC DEVELOPMENT IN OTHER CITIES AND LOCATIONS IN SOUTHEAST ALASKA TO CREATE A LOCAL ENVIRONMENT OF SERVICES AND OFFERINGS ATTRACTIVE TO COMMERCE ORIGINATING FROM OUTSIDE THE CBJ, AND TO ACTIVELY PARTICIPATE IN DEVELOPMENT AND IMPLEMENTATION OF REGIONAL SUSTAINABLE DEVELOPMENT GOALS.

Standard Operating Procedures

5.4 - SOP1 Work with the Juneau Economic Development Council (JEDC) to maintain a current Overall Economic Development Plan related to both local and regional economic development.

5.4 - SOP2 Encourage regional marketing for locally-made goods and locally-provided services and encourage partnerships in producing and marketing regionally-made goods and services.

5.4 - SOP3 Participate in regional planning processes.

5.4 - SOP4 Consider the impact of local activities on regional systems. Coordinate with other regional communities and jurisdictions to avoid, minimize or reconcile intergovernmental and/or private-sector conflicts.

5.4 - SOP5 Encourage economic development; in particular, industries that represent regional economic strengths and that support the production and distribution of renewable energy sources.

5.4 - SOP6 Strengthen and expand the partnership between communities, Alaska Native corporations, and UAS in Southeast Alaska, using the Southeast Conference and other regional entities.

5.4 - SOP7 Strengthen Juneau's role as a regional services hub for such things as fisheries research, medical, retail, tourism, transportation, and education.

Implementing Actions

5.4 - IA1 Host symposia on fisheries management, research, and other topics.

5.4 - IA2 Host symposia on medical services and other topics.

5.4 - IA3 Encourage continued and expanded transportation systems that serve the Southeast Reg while retaining those systems currently serving the region.

5.4 - IA4 Evaluate the CBJ Charter and Code, and pursue adoption of an amendment to the appropriate document in order to allow the CBJ government to participate in private/public partnerships in constructing new facilities and supporting economic development in Juneau.

Downtown Juneau

Downtown Juneau is the traditional economic, civic, historical, and cultural center of the community. Over the years, shifts in population to the Mendenhall Valley, changes in retail and commercial activity within the borough, and growth in the cruise ship industry concentrated in the southeast downtown area have presented challenges to the downtown core. Identified concerns include lack of goods and services available in the downtown core, pedestrian and traffic congestion along Thane Road, Egan Drive and South Franklin Street; lack of parking for retail and residential units downtown; lack of seasonal housing for visitor-related employment in the summer and for legislators and their staff in the winter/spring; and the poor aesthetics of closed storefronts on South Franklin Street between October and April. Additional concerns include consistency of new building aesthetics with the historic character of downtown, potential fire hazards within the historic districts, nighttime security, and the noise and congestion of public inebriants in the South Franklin Street area.

To secure the sustainability of downtown, the area needs to create reasons to draw people to the area on a year-round basis. The CBJ government seeks a 24-hour, year-round, safe, attractive and dynamic neighborhood in downtown. This can be accomplished by increasing the supply of year-round housing as well as by encouraging year-round commercial and arts activities. The creation of an arts district in and around a new performing arts center and an expanded convention center would stimulate year-round visits to downtown by Juneau residents and regional visitors. Continued encouragement of businesses offering goods and services to local residents to locate downtown will improve its livability and vibrancy.

It is important that new development positively address community objectives for downtown, including providing goods and services to local residents, strengthening public access to the waterfront, enhancing the Capitol Complex, preserving historic structures and neighborhoods, creating new housing downtown, accommodating summer tourism, providing adequate parking and transit facilities, and preserving scenic vistas and view corridors. Careful planning for public facilities and development of an urban design concept and development standards for downtown are necessary.

New housing opportunities and commercial facilities should be designed to protect the visual prominence of historic downtown. Building height, scale, and orientation should be incorporated into downtown design guidelines, and land use regulations for downtown should be established to facilitate new housing above retail and cultural arts activities while strengthening the visual prominence of historic structures and scenic corridors and strengthening the multi-cultural character of the area. Steps should be taken to identify historically significant buildings throughout downtown and encourage, via tax relief or other incentives, building maintenance and preservation, including installation of sprinkler systems, before historic structures become economically beyond salvage. Increased building heights within the Historic District should not be allowed if it could result in the demolition of historic structures in favor of taller buildings.

[See also Subarea 6 Guidelines and Considerations in Chapter 11 of this *Plan*]

POLICY 5.5. TO MAINTAIN AND STRENGTHEN DOWNTOWN JUNEAU AS A SAFE, DYNAMIC AND PLEASANT CENTER FOR GOVERNMENT AND LEGISLATIVE ACTIVITIES, PUBLIC GATHERINGS, CULTURAL AND ENTERTAINMENT EVENTS, AND RESIDENTIAL AND COMMERCIAL ACTIVITIES IN A MANNER THAT COMPLEMENTS ITS RICH HISTORIC CHARACTER AND BUILDING FORMS.

Standard Operating Procedures

5.5 - SOP1 Work with the CBJ Historic Resources Advisory Committee (HRAC), federal and state agencies, and private volunteers, as appropriate, to promote historic and cultural preservation within the community's historic districts and neighborhoods.

5.5 - SOP2 Work with the Juneau Arts and Humanities Council and other cultural organizati year-round cultural arts venues, resources and events in downtown Juneau.

5.5 - SOP3 Coordinate, and possibly combine, planning for downtown with any development effort for the Capitol Complex.

5.5 - SOP4 Encourage development and retention of year-round businesses in downtown that provide goods and services to local residents.

Development Guidelines

5.5 - DG1 When reviewing applications for new downtown Juneau development, consider the visual impacts on downtown building form, urban design and view corridors, as well as impacts to the livability of downtown with regard to circulation, housing accommodations, air quality, noise and hazard abatement and provision of goods and services, to ensure downtown provides a clean, safe, attractive, dynamic, interesting, enjoyable, walkable, culturally diverse and affordable neighborhood within which to live, work and play.

5.5 - DG2 Consider the policies, guidelines and development recommendations of plans like the CBJ *Long Range Waterfront Plan*, the *Willoughby District Land Use Plan*, and the *Capital Transit Development Plan* when reviewing capital improvement programs and development permits for, or applicable to, the downtown Juneau area.

Implementing Actions

5.5 - IA1 Encourage new high-density residential development as in-fill housing above ground-floor commercial space or as adaptive re-use of historic commercial or other non-residential buildings. Encourage development of housing for residents who would not own or need to park automobiles in the downtown area, such as students elders, and downtown workers. Encourage Single-Room-Occupancy (SRO) units, loft-style housing and live-work space in the downtown area.

5.5 - IA2 Develop a comprehensive multi-modal (e.g., pedestrian, bicycle, bus, vessel, vehicle) transportation plan for the downtown area that addresses the need to emphasize, provide for and/or improve non-private-vehicle transportation facilities throughout downtown while assuring adequate short-term parking to support business and government activities. This plan should be a key element of a larger transit system between the Alaska Marine Highway System Auke Bay Ferry Terminal, east and west Mendenhall Valley, Douglas, North Douglas, and downtown with convenient stops and bus transfer stations in-between, with dispersed park and ride facilities as components of this system, along with high-density, affordable housing. Consider implementing a downtown circulator shuttle or trolley.

5.5 - IA3 Facilitate the pedestrian usage of downtown with physical improvements, Land Use Code amendments, or other programs or initiatives which could include:

A. Encourage development that improves year-round safe, convenient and dry pedestrian facilities;

B. Extend the waterfront seawalk;

C. Repair and widen sidewalks and provide a network of canopies throughout downtown;

D. Separate pedestrian ways from vehicular traffic, where practical;

E. Encourage development of dry, secure bicycle storage throughout downtown; and

F. Consider revising the parking requirements in the CBJ Land Use Code to eliminate or drastically reduce the parking requirement for residences.

5.5 - IA4 Continue to work with the State of Alaska and UAS to determine the feasibility of reconstructing the State Office Building parking garage, which was partially funded in the FY13 state Capital Budget, or using the Bill Ray Center, respectively, to provide additional parking as part of a parking management program for Legislators, their staff and other state employees. This

parking could be shared with nighttime and evening patrons and customers of cultural a dining, shopping and entertainment activities and venues concentrated in a nearby Cultural Campus district.

5.5 - IA5 Encourage continued public and private redevelopment of the downtown waterfront area pursuant to the CBJ *Long Range Waterfront Plan* and considering the following:

A. Create additional buildable sites bordering the waterfront while protecting view corridors;

B. Encourage redevelopment for mixed uses and incorporate architectural guidelines to ensure aesthetic and harmonious building styles;

C. Expand dock facilities for small boats. Any expansion of docking facilities for cruise ships should be reviewed pursuant to the procedure outlined in the *Long Range Waterfront Plan* Section 3.9;

D. Promote cultural and historic preservation within the Juneau's historic districts and neighborhoods;

E. Promote heritage tourism by continued support of downtown historic interpretive signage; and,

F. Public and private investment in new and expanded dock facilities for cruise ships and other large vessels.

5.5 - IA6 Amend the Land Use Code to establish design guidelines for the South Franklin area of downtown to require appropriate year-round outdoor lighting and display window treatments to avoid the blighted appearance and effects of summer-season storefronts closed from October to May each year.

5.5 - IA7 Work with the CBJ Historic Resources Advisory Committee (HRAC) to advise on historic district design guidelines.

5.5 - IA8 Support and facilitate the abatement of fire hazards in downtown, especially by installing sprinkler systems in buildings and areas under buildings on pilings.

5.5 - IA9 Facilitate the development of a cultural campus arts district by establishing zoning regulations that would support its development [see 5.6 – IA2].

5.5 – IA10 Evaluate the CBJ Charter and Code, and pursue adoption of an amendment to the appropriate document in order to allow the CBJ government to participate in private/public partnerships in constructing new facilities and supporting economic development in downtown.

5.5 – IA11 Educate property owners and managers of existing ordinances regarding sidewalk snow and ice clearing and maintenance; enforce those ordinances as necessary.

5.5 – IA12 The CBJ government should conduct analyses of potential measures that can strengthen the retail, personal service, food and beverage service, entertainment and cultural offerings and other commercial operations for the downtown Juneau area, and particularly within the Downtown Historic District, which would convey the unique style and character of the community, and its historic and cultural roots, to cruise ship passengers.

Tourism and Visitors

Tourism is the largest private sector industry in Juneau, by number of employees[1] and plays a major role in diversifying the economy, and requiring partnerships and collaboration between tour operators, suppliers, retailers, service providers, and residents in order to thrive. The scale of operations involved in the tourism industry varies widely and serves different types of visitors. There are several market segments with distinct characteristics and needs, such as: cruise, convention, overnight independent, and group travelers, along with private yacht and small cruise ship users. Long-range planning efforts should focus on strategies to promote and

1 2011 Southeast Alaska Economic Indicators, JEDC

accommodate each type of use, while mitigating any associated adverse on- and off-site impacts.

It is important to develop and encourage visitor facilities and services that reflect and strengthen Juneau's identity as a unique historical, cultural, and outdoor recreation community in a way that assures the community's long-term sustainability as a visitor destination.

Facilities that serve arriving visitors, such as the Juneau International Airport and public docks and harbors are important gateway points into the community. These facilities should be maintained and aesthetically designed to strengthen Juneau's reputation as an outstanding visitor destination and capital city.

Cruise Ship Passengers

The City and Borough of Juneau had approximately 917,000 summer visitors in 2011, over 93% of whom were cruise passengers. The rate of growth of Alaska's cruise passenger volume over the last five years has fluctuated considerably. Volume increased by seven percent in 2007, was essentially flat in 2008 and 2009, then declined substantially in 2010 (-14%), before rising very slightly in 2011 (up one percent). Total passenger capacity is projected to grow by six percent in 2012 to about 940,000 (with Princess and Norwegian adding one ship each), and there are indications of additional growth in 2013. Historically, cruise ship passengers and crew have shown an increase in numbers due, in part, to the building of larger ships, better docks in downtown Juneau and the market demand for cruise vacations. Future growth is contingent upon ship sizes, dock facilities, shore-side infrastructure, and continued market demand. The scarcity of cheap oil to fuel aircraft and marine vessels could also reduce visitor traffic within the 20-year planning horizon of this *Plan*.

Public and private facilities have endeavored to keep pace with cruise-related growth with the addition of the Marine Park deck-over, South Franklin Street vehicle round-about and sidewalk widening, Seward Street upgrades, and the addition of the Princess Dock and the Cruiseship Dock facilities. New CBJ Docks and Harbors offices, Immigration and Customs Enforcement offices, and Visitor Center have recently been completed. Concerns associated with the current and future cruise ship growth include: The physical carrying capacity of the harbor area for larger ships and of area destinations for more visitors; pedestrian and vehicle congestion; view blockage by ships; visitor satisfaction due to congestion of destinations and the over-concentration of same or similar retail outlets in downtown; and, the community's changing character as a tourist rather than a fishing port city. The carrying capacity of the harbor area is proposed to be expanded by constructing new CBJ-owned docks that are capable of accommodating larger ships than the current docks are able to accommodate, but these expanded facilities will not address, and may even exacerbate, other identified impacts of concern.

Convention and Business Travelers

Convention and business travelers are an important sector of the year-round visitor traffic in Juneau. New and improved facilities and services to serve its needs should be provided. As Alaska's capital city, a regional general government and judicial services center, increasingly diverse regional shopping hub, and business and trade center, Juneau also hosts business travelers and constituents who come to lobby or work with colleagues and the government, and to hold conventions and meetings—which is especially important during the fall/winter/spring months when there are no cruise ship passengers. Summer convention and business travelers often extend their trips to take advantage of the local tourism experiences. Centennial Hall Convention and Civic Center, and the neighboring Andrew Hope Building and Juneau Arts and Culture Center are key facilities for supporting conventions and community events. It is important that Centennial Hall and its environs continue to be maintained and upgraded in order to remain competitive and sustain Juneau's ability to attract regional, state and out-of-state meetings. Convention-related visits should be encouraged to ensure continued growth of the segment. The Juneau Convention and Visitors Bureau plays an important role in promoting Juneau to these travelers.

Independent and Overnight Group Travelers

Independent travelers are a diverse group. They may arrive in Juneau via air, ferry, private boat or plane and engage in a variety of activities in the community. Overnight group travelers are those associated with tour itineraries that include one or more nights in the community. The distinguishing factor of these markets is their tendency to utilize the various lodging and camping facilities and their higher per-person-per-day spending pattern compared to a day visit cruise passenger. In general, independent travelers are not part of a packaged cruise tour and include

overnight visitation in their visit to Juneau. As cruise experiences diversify with the addition of optio tours, the definition blurs. This segment of the industry is primarily a summer market and should continue to be cultivated, while development that supports year-round visitor services and activities should also be encouraged.

Private Yachting and Small Cruise Ship Tourism

Private yachting and small cruise ship visitors are another primarily summer market. The economic benefits come in the form of the use of air service, food service and overnight lodging as well as support services throughout town. As a major marine town along the Inside Passage, capital city, retail center and airline connection, these visitors find Juneau to be a coveted port to visit. These visitors' time in the developed areas of Juneau generally ranges from overnight to multi-week stays. These modes of transportation also allow many of their guests to spend time in the community twice, as both a starting and ending location for their itinerary. These guests tend to be higher dollar-spent-per-person-per-day additions to the economy than day visitors; their longer stays also allow them to attend and participate in community events not typically frequented by cruise passengers, supporting local performing arts and other organizations that do not usually receive financial support from non-residents.

Winter Tourism

Juneau has potential to develop as a winter tourism destination, with attractions such as winter scuba diving and more traditional winter sports attracting increasing numbers of visitors. Efforts to promote Eaglecrest as a year-round outdoor recreation destination in Juneau and the surrounding region should continue. Improvements have been made to upgrade the lodge building, the parking area, chair lifts and the ski trails, all of which have increased Eaglecrest's appeal as a winter destination. Private-public partnerships have been developed recently - and should continue to be cultivated - to provide summer season activities to extend enjoyment of the area year-round. Development of additional diverse winter venues and activities in the community (hockey/cross-country trail/snowmobile course) could be a draw for additional regional visitors. As helicopter and snowcat-accessed skiing has become increasingly popular as a visitor draw to several southeast Alaska communities, more and more visiting skiers, snowboarders, and film crews spend time in Juneau and at Eaglecrest as part of their trip. Helicopter skiing in Southeast Alaska began in Juneau, and continues to be a niche tourism market during the otherwise slow winter tourism season.

Arts and Cultural Tourism

A new performing arts complex in downtown would be an additional asset for the community as a visitor destination and would provide a much-needed year-round venue for arts and cultural performances for residents and visitors to enjoy. A performing arts center could also be an anchor facility that might spur supporting development in the surrounding area for additional residential and commercial services. A performing arts center could also provide auxiliary exhibition and meeting space for events, conventions, and meetings held at Centennial Hall, the state capitol, or other venues.

Visitor Information Center

Visitor information centers are an integral part of the community infrastructure and provide an important service for in-state and out-of-state visitors as well as residents. Properly located and staffed, information centers increase visitor expenditures by educating visitors on activities and services available, serve as an outward expression of the community's hospitality, and serve as a resource for community events, activities and services. A new visitor information center that opened during the summer of 2012 offers a conveniently located source of information about the community.

The visitor industry is a major contributor to the economic diversity of the community and the strength and vitality of the downtown area. Some tourism-related activities may impact the quality of life for local residents due to noise, dust, fumes and congestion from buses, aircraft and marine vessels and crowded streets and sidewalks in downtown and other tourist destination areas. As a result of such community concerns, the volunteer Tourism Best Management Program (TBMP) was developed in 1996 to improve operational activities related to tourism in order to better balance the needs of local residents and support the established policy of protecting our natural attractions. Although Juneauites are wonderfully friendly and accommodating to their million plus annual visitors, there is a challenge to providing a quality and unique experience for the visitor while minimizing impacts to the

resident population, natural habitat and infrastructure. Long-range tourism planning is needed in a quality and unique experience for the visitor while minimizing adverse impacts to the resident population, fish and wildlife habitat, infrastructure and the scenery that makes Juneau a unique and enjoyable visitor destination and experience.

POLICY 5.6. TO ENCOURAGE TOURISM, CONVENTION AND OTHER VISITOR-RELATED ACTIVITIES THROUGH THE DEVELOPMENT OF APPROPRIATE FACILITIES AND SERVICES, WHILE PROTECTING JUNEAU'S NATURAL, CULTURAL AND ECONOMIC ATTRACTIONS FOR LOCAL RESIDENTS AND VISITORS ALIKE, AND TO PARTICIPATE IN THE ACCOMMODATION OF THE FUTURE GROWTH OF TOURISM IN A MANNER THAT ADDRESSES BOTH COMMUNITY AND INDUSTRY CONCERNS.

Standard Operating Procedures

5.6 - SOP1 Strengthen the local economy by enhancing and marketing Juneau as a year-round visitor destination.

5.6 - SOP2 Encourage recognition of the value of historic resources and their preservation to tourism in the community and promote accurate representation of the Juneau area's unique cultures. Utilize the Juneau-Douglas City Museum, and work with the Alaska State Museum and other groups such as the Gastineau Historical Society and Juneau Convention and Visitor's Bureau for dissemination of accurate Juneau area history.

5.6 - SOP3 Focus primary marketing efforts on cultivating over-night leisure and convention visitors.

5.6 - SOP4 Develop Eaglecrest as a year-round local and regional recreation and tourist facility.

5.6 - SOP5 Work with the tourism industry to create and market shoulder season (October through May) activities and recreational opportunities community-wide.

Development Guidelines

5.6 - DG1 Develop a long-range plan to ensure that areas that are unique or locally important, such as Treadwell, Last Chance Basin and Perseverance Trail, Mendenhall Glacier, and the Auk Village area are not adversely impacted by commercial use.

5.6 - DG2 When considering capital improvements and when reviewing permit applications for tourism-related developments, assess the costs and benefits of the proposed projects against the policies of this *Comprehensive Plan* and any CBJ-adopted Tourism Management Plan or BMPs.

Implementing Actions

5.6 - IA1 Adopt a Tourism Management Plan or Best Management Practices (BMPs) for Tourism and maintain an entity to carry out its provisions. This plan should outline a process by which the comprehensive impacts of tourism, as identified by the assembly and its subcommittees, will be evaluated, and negative impacts mitigated on: (1) an individual project or service basis to address the impacts of specific undertakings; (2) a sector basis such as the cruise sector, the convention sector or other sector if the negative impact is attributable to a particular sector; and (3) an industry-wide basis if the impact is attributable to the entire industry. The Tourism Best Management Practices Program (TBMP) is an example of a sector-wide mitigation program.

5.6 - IA2 Expand the Centennial Hall Convention and Civic Center facilities as needed in coordination with a combined or separate performing arts complex within a cultural campus area of downtown Juneau generally bounded by Gold Creek, Willoughby Avenue and Egan Drive. This cultural campus will provide much-needed venues for arts and cultural performances for residents and summer visitors to enjoy as well as additional exhibition and meeting space for events, conventions and meetings held at Centennial Hall and additional space for Legislators, staff and visitors to the Capital City. The State Library, Archives, and Museum project is a component of this cultural complex.

5.6 - IA3 Work with representatives from the cruise line and yachting industries, private developers, Juneau Convention and Visitors Bureau, and other tourism-related businesses to plan and develop additional or improved moorage and berthing facilities for private yacht charters and large pleasure craft, including additional lightering and short-term moorage facilities.

5.6 - IA4 Establish a covered walkway network throughout downtown.

5.6 - IA5 Conduct frequent appraisals of public and private transportation facilities to ensure they meet local and tour-related uses and demands.

5.6 – IA6 Encourage local private businesses to meet demand for varied and interesting tourism experiences.

EDUCATION

Juneau School District

The Juneau School District (JSD) is home to approximately 5,000 public school students. It is the fifth largest district in the State of Alaska. The District has six elementary schools; two mid-sized middle schools, two medium sized high schools, an alternative high school and a K-8 Charter School. Other District programs include Montessori Borealis, HOMEBridge home school, and a Tlingit Culture, Language and Literacy program. Almost one in four of the district's students are of Alaska Native heritage. The JSD employs 387 teachers and 358 support, administration, and maintenance staff.

A District Improvement Plan is used by the JSD to achieve compliance with the federal No Child Left Behind Act; recent changes in federal policy regarding this law may change how the JSD addresses this plan in future years. A 2010-2014 Strategic Plan has also been adopted by the JSD, one of the goals of this plan calls to "Strengthen community partnerships to enhance relevance in career technical programs, service learning, civics education, and across the curriculum."

In an increasingly interconnected world that is dependent on technology and information, it is critical that the JSD prepare students for both continuing education and for immediate employment, as students will want to follow both of these diverging paths. The mission of the JSD is: *In Juneau we are all partners in providing each student with the skills, knowledge and attitudes to be a contributing citizen in a changing world.*

POLICY 5.7. TO SUPPORT THE JUNEAU SCHOOL DISTRICT'S MISSION TO PROVIDE EACH STUDENT WITH THE SKILLS AND KNOWLEDGE NEEDED TO BE A CONTRIBUTING CITIZEN IN A CHANGING WORLD.

Standard Operating Procedures

5.7 – SOP1 Work with Juneau School District planners and principals to identify, plan, and provide the capital improvements required to support students and teachers in the educational experience.

5.7 – SOP2 Encourage the JSD to provide a full range of class offerings that will provide students with the skills necessary to enter the work force immediately after graduation or to continue their education, depending on their interests.

5.7 – SOP3 Provide the financial support necessary to attract and retain qualified teachers and administrators who are able to maintain a quality educational system for the children of Juneau.

Implementing Action

5.7 – IA1 Develop a Memorandum of Agreement with the Juneau School District, the Alaska Department of Labor, and UAS to enhance and/or develop training programs to address employment needs in the region.

University of Alaska Southeast

The University of Alaska Southeast (UAS) is an important contributor to the educational, social, cultural, and economic vitality of the community. Through cooperative efforts, UAS will be able to expand to accommodate its needs and develop in a manner consistent with the planning and development objectives adopted by the CBJ government. One of the attractions of the UAS campus to students and faculty is its proximity to natural areas and marine environments. Although campus facilities and student and faculty housing have made good use of the natural and scenic assets of Auke Bay and its environs, new development to accommodate expansion of UAS should be carefully designed to maintain and protect its scenic and natural surroundings.

POLICY 5.8. TO SUPPORT EXPANSION AND DEVELOPMENT PLANS OF THE UNIVERSITY OF ALASKA SOUTHEAST WHILE PROTECTING THE NATURE OF ITS SETTING, WHICH IS AN INTEGRAL PART OF ITS UNIQUE ADVANTAGE.

Standard Operating Procedures

5.8 - SOP1 Work with representatives of the University of Alaska Land Trust and State Office of Land Management and other agencies, as appropriate, to facilitate partnerships in land development for UAS facilities expansion and the development of student and faculty housing in and near the university campus.

5.8 - SOP2 Encourage UAS to provide a full range of university programs that take advantage of the local environment, both natural and governmental, to attract students from other Alaska communities as well as from outside of Alaska.

5.8 - SOP3 Work with the University of Alaska Southeast in the development of additional student and faculty housing, including designating lands near the university for high-density, family-size affordable student and faculty housing as well as for the smaller Single Room Occupancy (SRO) units.

Implementing Actions

5.8 - IA1 Allocate CBJ staff to work with UAS to develop and maintain a GIS modeling project to forecast the land needs for the expansion of UAS to accommodate 3,000 full-time students within the next 25 years.

5.8 - IA2 Support the provision of affordable housing for the UAS students and faculty on or near the campus through appropriate zoning and land management.

5.8 - IA3 Develop a Memorandum of Agreement with the Juneau School District, the Alaska Department of Labor, and UAS to enhance and/or develop training programs to address employment needs in the region.

Port Facilities

Historically, port development in the Juneau-Douglas area has been a significant factor in the layout and physical form of the community's built environment. Typically, port facilities are low scale, water-borne structures with low scale land-side support structures facing the water. This results in scenic vistas of the water from the uplands and scenic vistas of the townscape from the water. Shoreline port facilities are very well utilized and additional development of the Juneau and Auke Bay areas is expected to support commercial fisheries, maritime shipping and tourism industries. Care should be taken to ensure water access to such water-dependent land uses on port properties, rather than allocate these limited shoreline lands to commercial or residential uses that can be accommodated adequately on upland areas. Port development issues are interwoven into many sections of the *Comprehensive Plan* including waterfront development; downtown Juneau and Douglas; tourism/visitors; mining development; regional transportation; and commercial, industrial and public facilities.

The major port facilities for commercial and industrial goods and materials are located on the waterfront at Salmon Creek, at the Rock Dump east of downtown Juneau and in Auke Bay. Marine support facilities at Auk Nu Cove continue to add to activity levels in and near Auke Bay. Two privately-owned facilities near the northern terminus of Glacier Highway have gained in importance as the Kensington Mine has developed and placed additi

shipping demands on Northern Lynn Canal. Because of the geography, water depth, and development pa those areas, room for expansion is limited. Due to sedimentation and uplift, travel across the Mendenhall Bar from Gastineau Channel to Fritz Cove is impossible for most marine traffic except at the highest tides. Heavy truck traffic to and from the downtown port and the barge terminal at the rock dump adds to the noise and congestion in the downtown Juneau and downtown Douglas areas.

Port development continues to be of importance for both commerce and recreation throughout the borough. Cruise ship visits are increasing again, and vessel lengths are increasing, as are the number of passengers carried. Moorage for cruise ships and upland support areas have become extremely important to the tour industry and local private enterprise. Recreational boat use is also on the increase and the CBJ Harbormaster has a long waiting list for berths in the most popular size categories. Summer season private boat visits are also on the increase with small ocean-going yacht visits becoming more familiar in the Juneau area.

Ferry traffic in the Auke Bay area has remained fairly level for nearly ten years, with the system operating as frequently as aging equipment, inclement weather, and the transportation needs of the rest of the region allow. Even as the Alaska Marine Highway adds one or more new Alaska-Class ferries to its fleet, these vessels will likely replace existing main-line vessels and not add to service frequency or capacity. Seasonally, with fast ferry vehicles available for use in calmer seas, the Alaska Marine Highway system expands the number of voyages to accommodate increasing numbers of drive-on tourists during the summer. From time to time, Auke Bay is also visited by ore ships serving Skagway, Kensington, and Greens Creek Mines.

Government vessels and their related support activities also play an important role in port and harbor traffic and development. The U.S. Coast Guard maintains a fleet of small vessels at its downtown Station Juneau, where U.S. and Canadian buoy tenders congregate annually, and with a substantial number of employees working nearby at the Federal Building year-round. Additional Coast Guard vessels are based out of Auke Bay, and Coast Guard administrators have expressed interest in utilizing a deep-water port on the west side of Douglas Island, if and when a north crossing of Gastineau Channel is developed. Although the Coast Guard is the largest federal government employer in Juneau, they are not the only government agency that requires good access to port facilities. The National Oceanic and Atmospheric Administration (NOAA), the National Marine Fisheries Service (NMFS), U.S. Fish & Wildlife Service (USFWS), and State of Alaska Department of Fish & Game (ADF&G) all maintain research and/or enforcement vessels in Juneau throughout the year. U.S. and Canadian Navy, as well as Canadian Coast Guard vessels also visit Juneau on occasion, and require secure port facilities during their visits.

In the short term, it is important to expand and improve on existing waterfront industrial sites. Juneau currently does not have marine support facilities commensurate with demand from the commercial fishing and recreational sectors. A larger capacity vessel lift (at least 150 tons) is required along with additional uplands work areas. In the long term, development of new port facilities that would be more accessible to marine traffic of Southeast Alaska should be located along the western shore of Douglas Island, if deep water ports, breakwater facilities, adequate roads, and a channel crossing were made available to support this development. An appropriate West Douglas site should provide protected docking space and adequate land for storage and industrial facilities.

POLICY 5.9. TO FACILITATE AVAILABILITY OF SUFFICIENT AND SUITABLE WATER-BASED FACILITIES AND ASSOCIATED LAND-BASED ACREAGE TO SUPPORT WATER-DEPENDENT USES, AND TO WORK CLOSELY WITH THE PUBLIC AND PRIVATE SECTORS TO FACILITATE SUSTAINABLE MARINE COMMERCE, COMMERCIAL FISHING, SEAFOOD PROCESSING, RECREATION, PUBLIC ACCESS TO THE SHORELINE, AND ENJOYMENT OF THE WATERFRONT THROUGH DEVELOPMENT OF WELL DESIGNED PORT FACILITIES.

Standard Operating Procedures

5.9 - SOP1 Protect from land use conflict and/or displacement, potential new, existing, or expanded port and water-dependent industrial, commercial, governmental, and recreational facilities.

5.9 - SOP2 Encourage the expanded use of, and home porting in, Juneau by state and federal government vessels, including NOAA oceanographic and fisheries research vessels, and cooperate with those agencies in the development of adequate water dependent port and related upland facilities to meet present and future needs.

5.9 - SOP3 Evaluate the effect of changes in state and federal laws on water-related and water-dependent

facilities such as fuel docks, tidal grids, upland boat storage and repair yards, and processing plants, and the role of the CBJ government in facilitating compliance with those laws through the planning and zoning process. 5.9 – SOP4 Utilize the Capital Improvement Program to prioritize and schedule improvements or acquisitions necessary to the sustainable waterfront development and use called for in Policy 5.9.

Development Guidelines

5.9 - DG1 Assure public access to the shoreline and water when reviewing development applications.

5.9 - DG2 To the greatest extent practicable, orient new structures and facilities located on the waterfront in such a way as to preserve views of the water from public roadways and vista points.

5.9 - DG3 Deep water ports and navigable waters are valued assets and are critical to the sustainability of our economy and livability. New development along the shoreline should ensure that deep water navigable lanes and deep water port sites for marine vessels critical to the local economy are protected from encroachment from incompatible uses or obstructions.

Implementing Actions

5.9 - IA1 Develop neighborhood plans and create Marine Mixed Use zoning districts for Auke Bay and downtown Douglas that assure provision of adequate port, docks and harbor facilities and support land side facilities and services [see Guideline 1 and 2 for Subarea 3 and Guideline 6 for Subarea 9 in Chapter 11].

5.9 - IA2 Evaluate methods for assuring shore-side security without using fencing or security gates on CBJ-owned docks, harbors and recreational facilities used by residents and visitors.

5.9 – IA3 Assist with coordination of cruise ship traffic and commercial fishing operations to minimize conflicts.

5.9 – IA4 Investigate acquiring a larger capacity vessel lift (at least 150 tons) along with additional uplands work areas along Juneau's waterfront.

5.9 – IA5 Docks & Harbors should work closely with the commercial fishing and seafood packaging industries to ensure that the unique needs of these groups are met at local facilities.

Commercial and Industrial Development

Commercial and industrial activity requires sufficient and suitable land. Careful attention to the spatial requirements and locational considerations of potential uses is necessary to promote and maintain the local economy. As part of the 2008 Update to this *Plan*, CBJ staff conducted a survey of all business types and found the following, which are still relevant and accurate in 2013:

1. A need to expand the land available for retail and office uses, particularly in areas with high proximity to, and visibility from, major thoroughfares.

2. Industrially-zoned areas in Lemon Creek (near Costco) and near the airport have been encroached upon by non-industrial uses that have generated traffic congestion, higher land prices and lease rates, and commercial neighbors who are intolerant of the noise, odors, glare, dust, and other impacts of industry.

3. For industry to grow, including food processing and heavy material handling or manufacturing, a new industry-only zoning district category with parcels ranging in size from 5 to 20 acres each, is needed at a location near utilities and heavy load-carrying capacity roads, but distant from residential and general commercial uses.

4. A *West Douglas Conceptual Land Use Plan* has been adopted by the CBJ for the West Douglas New Growth Area that identifies a 50 to 70 acre "Development Area 2" that would provide opportunities for marine-related industry when access to and from the mainland is provided.

Areas around gravel extraction activities can convert to industrial districts once the land is leveled an extraction on those lands are complete.

POLICY 5.10. TO DESIGNATE SUFFICIENT AND SUITABLE LAND FOR ANTICIPATED COMMERCIAL AND INDUSTRIAL DEVELOPMENT AS PART OF ITS OVERALL ECONOMIC DEVELOPMENT PROGRAM.

Standard Operating Procedures

5.10 - SOP1 Follow the specific land use policies of this *Plan* that establish criteria for designation of commercial and industrial lands, including those cited in Chapters 3, Community Form and 10, Land Use.

5.10 - SOP2 When additional land is needed for commercial or industrial uses or when there are particular locational requirements for certain activities, initiate appropriate amendments to the *Comprehensive Plan* and Zoning maps to accommodate this need. These new commercial and industrial zones should be evaluated in relation to all applicable policies of the *Comprehensive Plan*.

POLICY 5.11. TO ENCOURAGE THE LOCATION AND GROWTH OF LOCALLY-BASED BASIC SECTOR INDUSTRIES THAT PROVIDE YEAR-ROUND, FULL-TIME EMPLOYMENT AND PROVIDE TAX REVENUES THAT SUPPORT PUBLIC SERVICES.

Standard Operating Procedure

5.11 – SOP1 Work with local businesses to develop parking, transportation, and land use policies that encourage and support local businesses.

Development Guidelines

5.11 - DG1 When requests are made to rezone industrially-zoned land to a non-industrial use district, assess and consider the impacts of the loss of this land for industry on Juneau's economy as a whole as well as on current needs for industrial land for expansion of existing industrial businesses. An industrial lands inventory and needs assessment may be required as part of such a rezoning application. Lands designated for Heavy Industrial (HI) Use on the Comprehensive Plan Land Use Maps should not be converted to uses not allowed in the Heavy Industrial (HI) land use definition of Chapter 11 unless an essential public purpose, as deemed by the Planning Commission and Assembly, warrants such conversion.

5.11 - DG2 When allocating public lands, infrastructure, tax benefits or other public benefits for new commercial or industrial activities, the CBJ government should consider giving higher priority to locally based basic sector industries over non-local candidate businesses.

Implementing Actions

5.11 - IA1 The CBJ should establish a new Heavy Industrial zoning district category that allows light industrial and heavy industrial uses and restricts or prohibits retail, office and residential uses. The director of CDD should identify current Industrial zoning districts or other suitable area(s) that should be designated as heavy industry zoning district and so designate those lands [see the Land Use definition for the Heavy Industrial (HI) land use category in Chapter 11].

5.11 - IA2 In an effort to avoid further encroachment on industrially-zoned lands by retail, office and other non-industrial uses, identify lands within current industrial districts that meet the location criteria for office and retail use and that have been predominantly encroached upon by these uses and rezone those lands for retail, office and heavy commercial uses. Any existing light or heavy industrial uses therein should be allowed to remain and, even, expand and relocate therein, if necessary to support that business [see the Land Use definition for the Light Industrial (LI) use category in Chapter 11].

5.11 – IA3 Develop an analysis, goals, and strategy to encourage businesses to locate or re-locate/expand in Juneau. Potential strategies for the CBJ government to consider include business incubators, site selection services, and/or tax incentives.

5.11 – IA4 Create heavy industrial zoning areas appropriate for the basic industry sector, in fisheries, mining support services, forest products, and others.

5.11 – IA5 Pursue funding and construction of a North Douglas Crossing, pursuant to CBJ Resolutions 2330(b) and 2415(am).

POLICY 5.12. TO ACTIVELY RECRUIT OUTSIDE INVESTMENT IN AND CORPORATE RELOCATION TO JUNEAU.

Implementing Action

5.12 – IA1 Identify one CBJ agency or staff member who is responsible for, or provide funding to a third-party group for, recruiting new investment and corporate relocation to Juneau.

Mining

Mining is an important private sector basic industry that provides well-paid full-time, year-around employment with benefits. The two active mines within the borough each provide over 200 such jobs and contract with local businesses for materials, transportation, repair services, and food service for mine operations. Additionally, smaller gravel extraction operations offer a critical resource to the community's private- and public-sector development and maintenance operations.

POLICY 5.13. TO SUPPORT THE EXTRACTION AND PROCESSING OF MINERAL RESOURCES IN AN ENVIRONMENTALLY-SOUND MANNER, GIVING PROPER RECOGNITION TO THE UNIQUE VALUES OF THIS COMMUNITY.

Standard Operating Procedure

5.13 – SOP1 Utilize the socioeconomic impact assessment required at CBJ 49.65.130(c) to ensure that capital improvements are scheduled so as to support and be relevant to relieving the impacts of large mines.

Development Guidelines

5.13 - DG1 Consult and coordinate with appropriate state and federal permitting agencies to review mining permit applications submitted under the provisions of the CBJ Mining Ordinance.

5.13 - DG2 Encourage coordination and cooperation among the mining, tourism, fishing and recreation industries in both development and operation of mining activities. Mining operations should not operate in a manner that would be detrimental to the natural environment needed by these other industries or to human and wildlife neighbors.

5.13 - DG3 Where gravel resources have been depleted by extraction activities, utilize these land resources to the most efficient extent possible by filling open pits with construction debris or other non-toxic materials and engineering the lands to be suitable for other uses, such as habitat mitigation, public facilities, recreation resources or residential, commercial, or industrial development.

Implementing Action

5.13 - IA1 Identify and map on the GIS system all abandoned, depleted or nearly-depleted gravel pits in the borough and identify suitable adaptive reuse strategies and land use designations for those lands.

5.13 – IA2 Develop a five-year Action Plan for the sustainable development or long-term maintenance of the CBJ's AJ mine property. The plan should address potential economic, environmental, and social impacts of the City's AJ mine property with or without development and describe actions the City should take to accomplish either objective.

Seafood Industry and Commercial Fishing

The commercial fishing industry is an important and stable sector of Juneau's economy, and supports a substantial and growing seafood processing sector. From a near total demise of processing around 1990, seafood processing has seen substantial reinvestment including two new larger plants, several smaller operations, and a number of Juneau-based direct market catcher processors vessels. Juneau seafood processing has an unusually high level of local ownership compared to most Alaska communities. Salmon fishing has recovered from disastrous impacts of farmed salmon in the late 1990s. Hatcheries help assure healthy and viable commercial wild salmon stocks. Juneau has also become a substantial landing port for halibut and sablefish longliners since the advent of Individual Fisheries Quotas (IFQ). One half of the state-collected Fisheries Business Tax (FBT, a.k.a. "raw fish tax") goes back to the community in which the fish are landed for processing, not where they are caught. CBJ FBT receipts are used to support Docks and Harbors fisheries related infrastructure investment. Fast and affordable air cargo transport of fresh fish, crab and other seafood is also important to the commercial fishing industry, and Juneau's region-leading airport gives Juneau-based fishing enterprises a competitive advantage in serving fresh seafood markets.

Segments of the tourist economy also rely on local fishery resources, and charter sport fishing is an important contributor to the local economy. Likewise, local expenditures of resident sport fishermen help support many local Juneau businesses.

Commercial fishing and other forms of commercial marine activity combine with sport and pleasure marine activity to create a stronger market for facilities and services. However, Juneau does not currently have uplands marine support and service facilities commensurate with the needs of the commercial fishing fleet and from other boaters.

In 2010, 689 Juneau residents were employed as commercial fishermen and crew; although the wages paid in the seafood industry were only 2% of Juneau's total wages, the $21.5 million in basic-sector wages for this industry are not insubstantial. The 14.5 million pounds of seafood product processed in Juneau in 2010 had a wholesale value of $43 million. (Juneau Economic Development Council, *2011 Juneau & Southeast Economic Indicators*)

POLICY 5.14. TO SUPPORT THE DEVELOPMENT AND EXPANSION OF THE SEAFOOD INDUSTRY AND OF SERVICES AND FACILITIES THAT BENEFIT COMMERCIAL FISHING ACTIVITY AND TO ATTRACT AND RETAIN HARVESTERS, PROCESSORS, AND SUSTAINABLE AQUACULTURE ACTIVITIES IN JUNEAU.

Standard Operating Procedure

5.14 - SOP1 Encourage the location and expansion, as envisioned in Alaska Department of Fish & Game regional plans, of hatcheries and remote release projects in Juneau to support the local fishing industry.

Implementing Actions

5.14 - IA1 Assist in the development and provision of facilities suitable for commercial fishing vessels, repair facilities and land for businesses that repair fishing vessels and gear.

5.14 - IA2 Assist in the development of a large-capacity ice plant in the Auke Bay area.

5.14 - IA3 Assist in the location and permitting of suitable sites for additional seafood processing activities.

5.14 - IA4 Support mariculture that does not have unacceptable impacts on important fish and wildlife habitat and other maritime-related activities and ensure adherence with state law and protocols on mariculture practices. Use of invasive species or harmful food or waste products in these operations should be prohibited.

5.14 – IA5 Continue to support seafood industry activities as part of a diversified working waterfront in Juneau.

5.14 – IA6 Support educational and safety programs that are targeted to the fishing industry.

5.14 – IA7 Maintain and enhance local rivers and streams that support fish vitality and sustainable fish populations.

Use of Favorable Energy Assets for Job Creation

A stable and reasonably priced source of electricity will enhance the community's business and industrial climate. Juneau's favorable electric energy assets include a current hydroelectric supply with a back-up system that uses diesel fuel. Potential renewable energy resources within the borough should be protected.

POLICY 5.15 TO TAKE ADVANTAGE OF JUNEAU'S FAVORABLE ELECTRICAL ENERGY ASSETS TO ADD QUALITY JOB OPPORTUNITIES.

Implementing Actions

5.15 - IA1 Encourage the JEDC to promote Juneau's favorable energy assets to potential investors, entrepreneurs, and employers.

5.15 - IA2 Implement an aggressive water and energy conservation program; and use other renewable energy sources, such as geothermal and micro-hydro electrical generators.

5.15 - IA3 Actively support hydroelectric development and other renewable energy projects.

Reduce Housing, Health Care, and Transportation Costs

As the Housing Chapter (4) of this *Plan* illustrates, high housing costs are a significant burden for many Juneau residents, and results in many Juneau residents moving away because they simply cannot afford to live in Juneau. Health care, groceries, and other goods and services also cost more in Juneau than in the nation in general. The Council for Community and Economic Research found that in 2011, Juneau had the highest cost of living of any of the surveyed Alaska communities, which included Anchorage, Fairbanks, Kodiak, and Juneau; Juneau's costs were significantly higher for housing and health care, and was the lowest of the four cities for transportation.

COST OF LIVING BY CITY

Index Category	*Percent of Composite*	*Anchorage*	*Fairbanks*	*Juneau*	*Kodiak*
Grocery Items	13.36%	137.4	132.4	130.8	149.1
Housing	28.64%	149.8	140.3	172.8	123.1
Utilities	10.46%	98.2	211.5	163.7	152.2
Transportation	10.66%	112.0	109.9	107.9	130.5
Health Care	4.44%	139.4	124.5	149.8	133.0
Misc. Goods & Services	32.44%	126.3	120.2	113.2	113.2
Composite	100.00%	130.6	137.0	139.0	127.6

ACCRA National Cost of Living Index, Council for Community and Economic Research, 2012

Table 5.1

Just as there is little that the CBJ government can do to impact the price of grocery items or miscellaneous goods and services, many external factors relating to the cost of health care are outside the control of the CBJ government and ultimately becoming a healthier community through lifestyle changes can we, as a community, reduce our collective health care costs.

Bartlett Regional Hospital is owned and operated by the CBJ through an enterprise fund and appointed governing body. CBJ government oversight of the growth and expenditures of the hospital and services can provide a mechanism to reduce health care costs for residents.

The community and government of Juneau can, however, have a direct impact on the costs of housing and transportation through regulation and policy. Although the critical housing shortage that Juneau currently

experiences is discussed in detail in Chapter 4 of this *Plan*, it is relevant to note that economic develop Juneau is stymied by a lack of affordable housing. Many employers cannot afford to pay employees enough for the employees to be able to afford housing, resulting in a situation where jobs are unfilled and potential employees leave Juneau in search of cheaper housing elsewhere. Employers must recognize this impediment to their operations, and may find that it is in their own interest to provide housing for some employees, especially lower-wage workers. Businesses are also hard-pressed to justify initial investment in Juneau, given the high cost of living and how difficult that makes attracting qualified employees. When existing housing is purchased by employers to accommodate seasonal workers, this alleviates some of the impediments to their ability to retain staff, but at the cost of reducing the available housing stock for year-round residents. This complicated situation demands a multi-faceted approach to reducing housing costs in Juneau, but at base, an increased supply of residential units is desperately needed to support Juneau's economic development.

This *Plan* calls for increasing residential densities where existing public utilities and services can be provided with no need to extend those services to new areas; this strategy results in lower infrastructure costs as well as making trip origins and destinations (home and work, school, or recreation) closer and more convenient to one another. When trips are shorter, they can more often be made by walking or bicycling, both free modes of transportation that play important parts in healthy lifestyles that include daily exercise – thus, non-motorized transportation can reduce both transportation and health care costs.

Furthermore, the economic return on investment - as measured by number of jobs created per $1 million spent on a project - for non-motorized transportation (bicycle and pedestrian) infrastructure projects outweighs the return for road-only projects: constructing or upgrading non-motorized transportation infrastructure such as bike lanes, sidewalks, and separated paths creates 9-11 jobs per $1 million spent, compared to 8 jobs created per $1 million spent on road-only projects.[2]

Another benefit of focusing future growth and development along existing services is that efficient transit service can be provided to more residences and destinations, and nationwide research shows that most transit riders walk or bicycle at at least one end of their transit ride – again improving their health through active and largely free transportation choices. With an estimated annual cost of $8,946 to own and operate an average sedan[3], finding housing in a location where an automobile is an option and not a necessity, or where one automobile will suffice for a family instead of two, has the potential to save Juneau households considerable money that can then be spent on other expenses and discretionary purchases.[4]

Transit already plays a critical role in getting employees to jobs. According to data compiled by the JEDC and Capital Transit, in FY11 over 150,000 trips to reach jobs were made on Capital Transit by riders who could not have gotten to those jobs without Capital Transit. Including those ride-dependent trips, over 300,000 trips to work would have been difficult or impossible for the worker without Capital Transit. Simple assumptions that ride-dependent trips had to be round-trip and that workers are scheduled for five shifts each week let us estimate that the equivalent of 323 full-time (FTE) jobs in Juneau can only be filled because of Capital Transit, and that it would be difficult for 610 FTE jobs to be filled without Capital Transit. Without Capital Transit's services, Juneau employers would be unable to fill a number of FTE jobs almost equivalent to the U.S. Coast Guard (363 employees), or more jobs than all of those at Tlingit-Haida (250) or in the entire Manufacturing sector (279). The 610 jobs that would be difficult if not impossible to fill if Capital Transit were to cease operations are roughly equivalent in number to the entire Financial Activities employment sector (608 employees).

When the ride-dependent trips to school and shopping are also considered, it is clear that Capital Transit has a far-reaching impact on economic development in Juneau.

2 *Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts*. Political Economy Research Institute, University of Massachusetts, Amherst, June 2011

3 American Automobile Association, *Your Driving Costs* 2012

4 *The relevance of parking in the success of urban centers*, London Councils, 2012, reports that although car-borne shoppers spend more per visit, they shop less frequently, and shoppers who arrive via non-car modes (transit, biking, or walking) all spend more per month and shop more frequently. http://www.londoncouncils.gov.uk/policylobbying/transport/parkinginlondon/parkingurban.htm

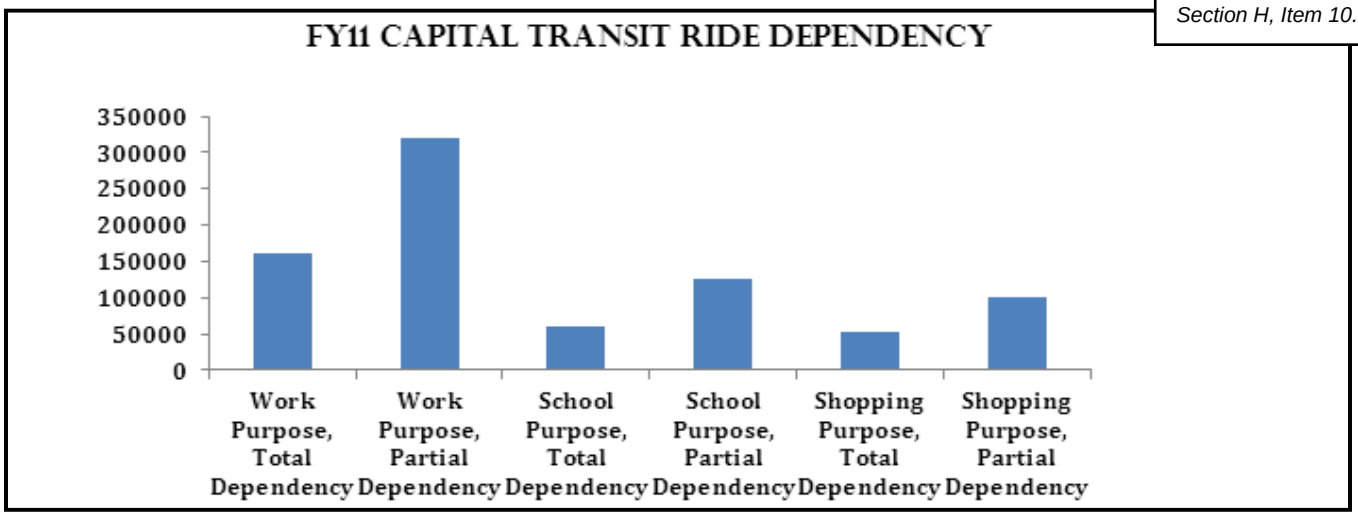


Figure 5.1

POLICY 5.16 TO CONSIDER THE ECONOMIC IMPACTS OF MUNICIPAL INVESTMENT AND TO PRIORITIZE PROJECTS THAT WILL RESULT IN A DECREASE IN THE COST OF LIVING FOR JUNEAU RESIDENTS OR THAT WILL CREATE A GREATER NUMBER OF JOBS IN THE COMMUNITY OR REGION.

Standard Operating Procedures

5.16 – SOP1 Support and promote in-fill development that increases the residential density and/or diversity of uses in neighborhood and emerging neighborhood centers, especially around existing transit routes and major transit stops or transfer points.

5.16 – SOP2 Support and fund non-motorized transportation infrastructure projects throughout the roaded area of the borough, with priority given to those projects identified in the most recently adopted *Non-Motorized Transportation Plan* or *Safe Routes to Schools Plan.*

5.16 – SOP3 Support and fund expansion of Capital Transit within the Urban Service Area and emerging destinations that are not within the Urban Service Area as needed to provide convenient transit service as called for in the Transit First Policy of Chapter 8 of this *Plan*.

5.16 – SOP4 Prioritize funding for projects that will keep a higher proportion of project funding in the local economy.

5.16 - SOP5 Provide oversight of CBJ owned and operated health care facilities to address both access and affordability of health care services for all Juneau residents.

Implementing Action

5.16 – IA1 Choose and prioritize capital improvement projects within the Capital Improvement Program to encourage economic development.

5.16 – IA2 Develop, adopt, and implement an Economic Development Plan for the City and Borough of Juneau.

POLICY 5.17 TO CONSIDER THE ECONOMIC IMPACTS OF PUBLIC AND PRIVATE INVESTMENT, AND TO ENSURE THAT THE COSTS OF THOSE IMPACTS ARE CLEARLY DISCLOSED AND ADDRESSED SO AS TO NOT UNDULY BURDEN THE COMMUNITY AT LARGE.

Standard Operating Procedure

5.17 – SOP1 Utilize the Capital Improvement Program to focus public investment in infrastructure so as to facilitate private investment in new or expanded basic industries.

Development Guidelines

5.17 – DG1 The private and public sector have the primary responsibility to anticipate the necessary roads, ports, worker housing and other infrastructure and facilities needed to adequately serve emerging needs.

Juneau as a Center for Entrepreneurship and Innovation

Entrepreneurship is a major driver of economic growth in the United States. The innovation created through entrepreneurship can open doors to many forms of economic and social development with positive implications for Juneau and Southeast Alaska.

POLICY 5.18. TO ENCOURAGE AND SUPPORT ENTREPRENEURSHIP AND INNOVATION IN THE ECONOMY OF JUNEAU AND SOUTHEAST ALASKA.

Standard Operating Procedures

5.18 - SOP1 Deliver programs designed to teach entrepreneurial skills to Juneau's youth.

5.18 - SOP2 Work with the JEDC, federal and state agencies, and local service industries to support small business startups.

5.18 - SOP3 Establish policies to create a supportive environment for entrepreneurial activity and innovation to flourish.

5.18 - SOP4 Encourage a supportive culture for business risk taking.

5.18 – SOP5 Encourage the Juneau School District and the University of Alaska Southeast to graduate workers prepared for the creative/innovation economy.

5.18 – SOP6 Encourage home-based businesses, especially during the start-up phase.

5.18 – SOP7 Work with the business community and local entities to sponsor internships for youth.

5.18 – SOP8 Work with the business community to introduce a Business Summer Camp.

5.18 – SOP9 Work with local entities to create a mentoring network of successful entrepreneurs.

5.18 – SOP10 Work with other southeast Alaska communities to foster innovative solutions to local challenges.

Development Guidelines

5.18 – DG1 Establish policies and programs to ensure the availability of risk capital.

Implementing Actions

5.18 – IA1 Provide financial and volunteer support for programs provided by the Juneau School District, community schools, and the After School Coalition that promote extracurricular or in-school entrepreneurial education and activities for youth.

5.18 – IA2 Provide financial support to provide micro/small loans.

5.18 – IA3 Create a Mayor's Award for Entrepreneurial and Business Innovation.

Juneau as an Environmental and Resource Development Research and Education Center

Juneau and the Southeast Alaska region are located in a unique area of the world, with distinct climate, geographic, oceanographic and biological characteristics. These characteristics and conditions can be ideal for biological, meteorological, oceanographic and other types of research, the results of which could have far reaching applications around the world. In addition, industries already located in the region often have need of support through scientific research. Locating, expanding and supporting research facilities in the region not only helps support existing

industries with real time, real location, and real condition research, but can increase economic the region through attracting research dollars and jobs to be located here in Juneau. Currently, several research agencies and facilities are located in Juneau, and more are located in other communities throughout the region.

Research agencies located in Juneau include:

- U.S. Forest Service Pacific Northwest Research Station – Forestry Sciences Laboratory
- University of Alaska, Fairbanks - Juneau Center of the School of Fisheries and Ocean Sciences
- National Oceanic and Atmospheric Administration's National Marine Fisheries Service, Alaska Regional Office and Auke Bay Laboratory
- University of Alaska, Southeast
- Alaska Coastal Rainforest Coalition
- Alaska Department of Fish and Game
- U.S. Geological Survey
- Alaska Department of Natural Resources
- Alaska Department of Environmental Conservation
- Research agencies located in the Southeast Alaska region outside of Juneau include:
- Alaska Wood Utilization Research and Development Center (Sitka)
- Sitka Sound Research Center (Sitka)
- University of Alaska Southeast (Sitka and Ketchikan)
- Oceans Alaska Marine Science Center (Ketchikan)

Additionally, other research functions exist within other agencies, nonprofit entities, and businesses in Juneau and the region.

The Research industry is labor intensive, with high paying, year around, high-quality jobs. The industry is stable and growing, environmentally benign, non-competitive with other industry, and has a low burden on government. In 2010, the University of Alaska alone spent about $131 million on research activities statewide. The needs of local industries for research outweigh the ability of local research resources, and often, research services are sought from outside of the region. Expanding research services available locally will not only keep local research dollars here, but can attract new research jobs and dollars to the area. Juneau and the Southeast Alaska region have the potential to become a world class arena for biological, meteorological, environmental, renewable energy, and other types of research with potential worldwide applications. In addition, expanded research activities in the region will likely provide support, education, mentoring, and eventual employment opportunities for our children in science, technology, engineering, and math fields.

POLICY 5.19 TO ENCOURAGE AND SUPPORT CONTINUATION AND EXPANSION OF LOCAL AND REGIONAL RESEARCH ACTIVITIES, BOTH ACTIVITIES THAT SUPPORT REGIONAL INDUSTRY, AND THOSE THAT ATTRACT NEW JOBS AND RESEARCH DOLLARS TO JUNEAU AND THE REGION.

Standard Operating Procedure

5.19 - SOP1 The City and Borough of Juneau is a member of the UAS Alaska Coastal Rainforest Center (ACRC).

Implementing Actions

5.19 - IA1 Facilitate coordination and communication between existing research entities in the region, and those who do research for the region, but are not located here.

5.19 - IA2 Contact leaders of the regional industries to determine their scientific research needs, an communicate that to the research entities in the region.

5.19 - IA3 Actively promote Juneau and the region as world class research and education arenas.

5.19 - IA4 Encourage location of research facilities and activities in Juneau and the region. Actively encourage NOAA and other research vessels to homeport in the region.

Reduce Leakage

While Juneau has a significant number of local retail businesses, there is considerable "leakage" of retail sales, as well as leakage related to nonlocal goods and services consumed in Juneau that could potentially be produced or provided by local businesses.

"Leakage" means any good or service consumed in Juneau that could be produced or provided by local businesses, but is currently brought in from other places. Leakage occurs primarily through internet sales, mail orders, and shipping in goods or services that could potentially be produced or provided locally. For example, additional goods offered in local retail stores, or the manufacture of equipment used in mining or fishing, or the use of local professional services firms would all increase local purchases, increase local jobs, and reduce economic leakage.

The goal of reversing economic "leakage" is to expand local job opportunities. To illustrate the issue, the Juneau Chamber of Commerce has initiated a "look local first" campaign to highlight the literally hundreds of business opportunities to replace nonlocal goods and services with local ones and thereby create more local jobs.

POLICY 5.20. TO ENCOURAGE RESIDENTS AND BUSINESSES TO "LOOK LOCAL FIRST" FOR PURCHASES OF GOODS AND SERVICES.

Standard Operating Procedure

5.20 – SOP 1 Support and/or lead efforts to educate residents and businesses regarding the impacts of spending money locally and how money spent within Juneau remains within Juneau's economy longer.

5.20 – SOP2 Encourage local purchases by schools for their food programs. Encourage local purchases of goods by local industries. Encourage use of Centennial Hall or other CBJ facilities for conferences or other extended events.

Implementing Action

5. 20 – IA1 Review the CBJ purchasing code and amend as necessary to promote local purchase to the greatest degree practical and legal.

CHAPTER 6
ENERGY

The topic of energy is pervasive to every element of human activity, interaction and comfort. The economic impacts associated with fossil fuel consumption, and the unique potential of the Juneau's renewable hydroelectric sites, presents policy makers with an enviable opportunity for guiding future community growth toward renewable energy sources. There is also the need to balance the needs of the consumers with the sustainability of our energy sources.

Access to affordable, secure supplies of energy is necessary for almost every activity of government, business, and private residents. The overall goal of an energy policy should be to assure least cost alternatives to energy sources. Costs could be classified as broadly as actual out of pocket costs to the consumer, impact costs to the city budget or impact costs on our environment. Given the ways in which communities are affected by, and affect the global arena, energy policy should reflect the need to establish a fair degree of independence from uncertain international energy markets, and to ensure responsible contributions of our community to the global human and natural environment. The ultimate goal needs to be creation of an energy system that is sustainable, locally and globally. Energy policies can play a crucial role in the development of a local, regional, and national energy system that can help assure the long-term economic viability of Juneau and the Southeast Alaska region.

Further development of renewable energy sources will be needed to convert energy systems from fossil fuels for both local and regional use. Juneau is fortunate to have significant but not unlimited hydro opportunity as well as tidal and other potential renewable energy sources, all of which should be elements of a comprehensive energy program. Least-cost, or integrated-resource planning, in which investment in energy conservation is weighed against investment in energy purchase, and in which life-cycle costs are included in all decision making, can provide a framework for cost-effective, responsible energy planning and conservation. Working capital must also be equally weighed as it is likewise a scarce resource economically defined. Education is an important element in giving direct assistance to energy users and for maintaining an informed citizenry. As used below, "near-term" means one to five years and "long-term" means five years or longer.

The Alaska Electric Light & Power Company (AEL&P) is the Regulatory Commission of Alaska certificated electrical utility provider for Juneau in its specific service area, which does not encompass the entire borough; all efforts to plan, manage, or otherwise affect electrical energy production, distribution, or use should therefore involve AEL&P. Another private company, Juneau Hydropower, Inc., is in the process of applying for permits to construct a new hydroelectric project at Sweetheart Creek at the time of this update. Currently all electrical energy production with associated transmission is provided by AEL&P.

The increased use of renewable energy needs to be encouraged to offset energy consumption of non-renewable sources. This should be accomplished in two manners: conservation of energy consumption with more efficient application and reduced need; and increased development of renewable resources. Programs to reduce energy consumption including building envelope heat loss reduction; application of heat pump technology, biomass and other technologies; and LED lighting application, all of which should be supported. Renewable energy producers should be encouraged to continue planning for development, and ultimately the implementation of renewable energy sources, including hydropower, to offset the consumption of non-renewable energy sources.

There is ultimately limited, although substantial, hydroelectric generation potential in the Juneau area, and associated costs of extending transmission lines to remote sites well suited for hydropower development are high. Users should consider taking steps to conserve available energy or private industry will need to speed up the pace of developing and constructing new hydropower facilities based on market forces.

The 2011 *Juneau Climate Action and Implementation Plan* (CAP), adopted by the Assembly under Resoluti describes fossil fuel energy use in Juneau by a variety of sectors, and makes recommendations for conservation and alternative sources that do not have the negative external effects of fossil fuel energy sources; namely, dependence on foreign sources, negative impacts to air quality, and the climate impacts of greenhouse gas emissions from fossil fuel combustion. The CAP, its goals, and its strategies should be referred to when making energy plans, policy or investment decisions so as to ensure that Juneau's energy systems reflect the local and global impacts of energy decisions.

Energy Planning

For many reasons, energy production, conservation, and use have come to the forefront of world consciousness in recent times. In Juneau, the avalanche-induced disruptions of the supply of hydroelectric energy to the community in the spring of 2008 and again in 2009 made energy issues even more visibly relevant to the well being of the community. New energy sources are being discovered and new technologies for energy generation, transmission, and conservation are being developed. Federal and state funding sources are becoming available for renewable and/or efficient energy planning and projects. It would be beneficial to the community for the CBJ government to work with utility providers and energy developers to examine these emerging sources, technologies, and funding sources for potential use in the community and as a revenue source when sold to ratepayers such as cruise ships, Greens Creek Mine, the Couer Kensington Gold Mine, and other future large load users.

Understanding where energy is used in the community (internal and external uses), its sources, and the financial and social implications of energy use is fundamental to establishing a sound policy for energy development and use. In order to implement the policies outlined in this chapter it is necessary to establish a plan for the future use of energy resources in the borough. The *Juneau Climate Action and Implementation Plan* of 2011 (CAP) contains much more detailed analysis of energy use than is included in this Plan.

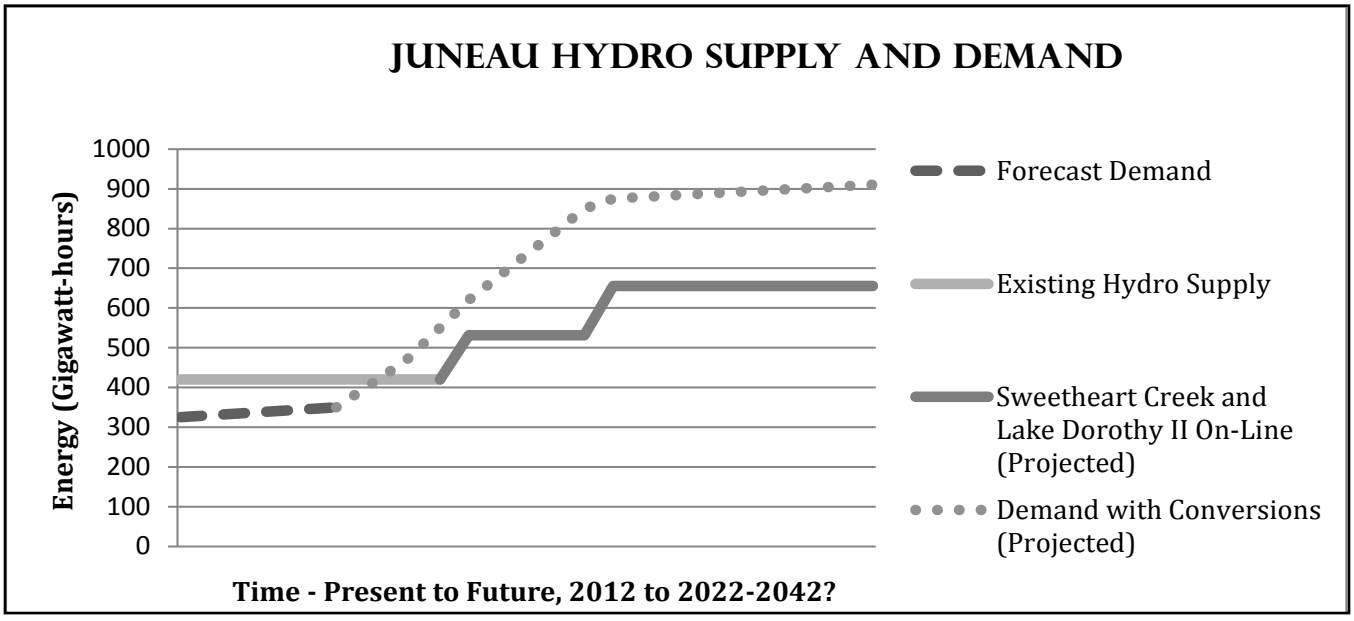


Figure 6.1

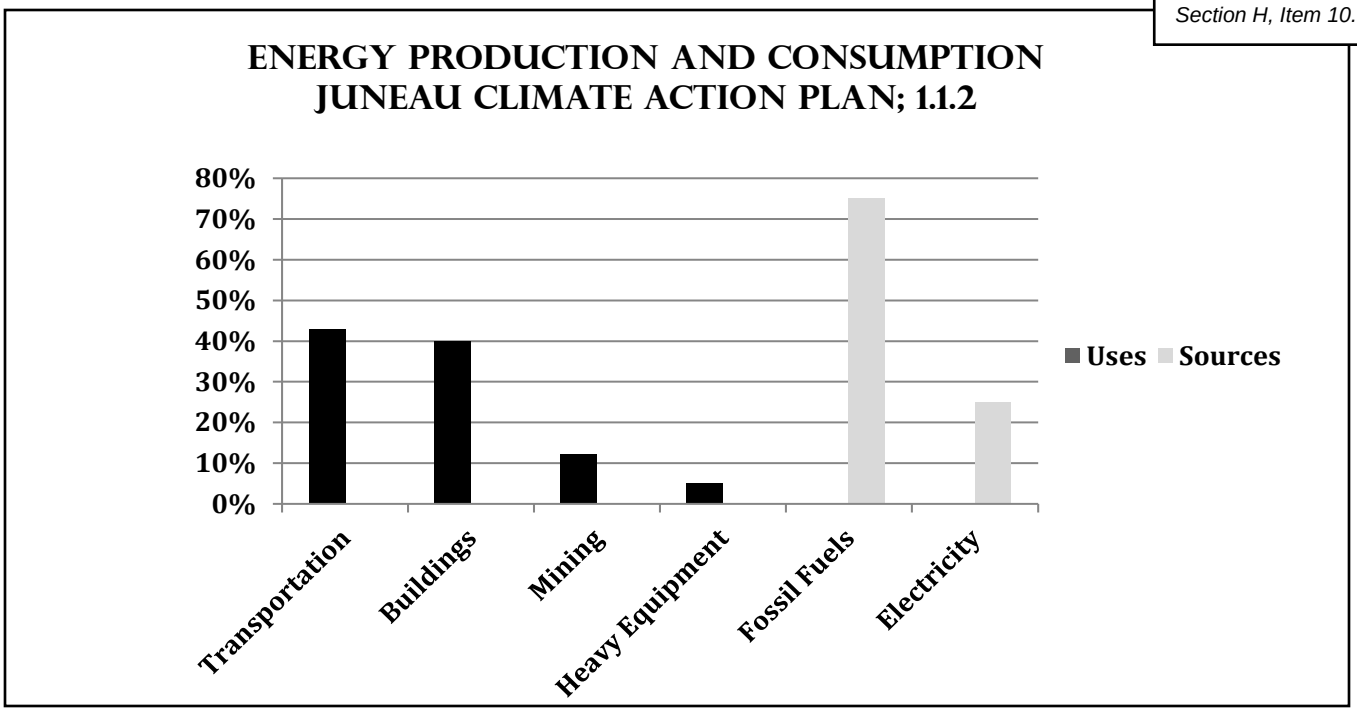


Figure 6.2

POLICY 6.1. TO WORK WITH UTILITY AND ENERGY PROVIDERS TO ANALYZE THE LOCAL ENERGY SYSTEM, POTENTIAL RENEWABLE ENERGY SOURCES, AND EMERGING TECHNOLOGIES; TO ESTABLISH A LONG-TERM ENERGY PLAN; AND TO IMPLEMENT THAT PLAN FOR THE AFFORDABLE AND SUSTAINABLE USE OF ENERGY IN THE COMMUNITY.

Implementing Actions

6.1 - IA1 Analyze Juneau's internal and external energy economies and systems throughout system life-cycles.

6.1 - IA2 Develop and implement a long range energy plan for Juneau that addresses both private-sector, public-sector, and CBJ government energy conservation and management goals, objectives, and an action plan. The plan should consider renewable energy sources, emerging technologies, and other plans being developed within the region and the state.

6.1 - IA3 Host research projects that identify energy sources that use renewable resources such as hydro, tidal, solar, wind, and energy from organic waste (e.g., cellulosic ethanol) that can be used by households, businesses, and the public sector.

6.1 - IA4 (i) Develop and examine scenarios for alternative long-term energy plans, including a risk management plan.

(ii) Based on alternative scenarios, identify courses of action for each scenario.

(iii) Implement actions that maintain flexible energy strategies that best meet Juneau's future energy needs.

6.1 – IA5 Conduct public meetings to explain and develop the community's long-range energy plan.

6.1 – IA6 Once an energy plan is developed, undertake an immediate reconsideration and rewrite of the policies and actions in this chapter for approval by the CBJ Assembly.

6.1 – IA7 Assign a CBJ staff member to work with the Commission on Sustainability and provide them resources as necessary to ensure that Implementing Actions 6.1 – IA1, 2, and 4 are implemented in the near-term.

POLICY 6.2. TO SUPPORT THE DEVELOPMENT OF RENEWABLE ENERGY RESOURCES IN JUNEAU AND IN THE SOUTHEAST ALASKA REGION.

Implementing Action

6.2 - IA1 Work with the State of Alaska, Southeast Conference, Tlingit Haida Central Council, Douglas Indian Association, AEL&P, independent energy producers, and other interested entities toward the planning, funding, and development of renewable resources in Juneau and within the region.

6.2 – IA2 Promote conversion from fossil fuel heating systems to geothermal, thermal, heat pump, biomass, or biofuel systems.

6.2 – IA3 Promote the development and use of renewable energy sources to help meet the goals, strategies, and objectives of the *Juneau Climate Action and Implementation Plan* of 2011.

POLICY 6.3. TO SUPPORT THE DEVELOPMENT OF A SOUTHEAST ALASKA INTERTIE.

6.3 – IA1 Work with the State of Alaska, Southeast Conference, Tlingit Haida Central Council, Douglas Indian Association, AEL&P, independent energy producers, and other interested entities toward the planning, funding, and development of a regional electrical intertie.

6.3 – IA2 Support State of Alaska projects to extend electrical power along Glacier Highway to Cascade Point to improve highway safety, provide emergency services, reduce electrical costs and carbon emissions, and facilitate economic development.

Support State Capital Functions Through Energy Efficiency

As Alaska's capital city, it is vital for Juneau to offer modern transport and communications systems and facilities to Alaska residents who wish to participate in state legislative affairs. Over the years, the community has invested in such facilities, systems, and infrastructure and will continue to support effective citizen participation in state affairs. As the availability of fossil fuels decreases throughout the world, it will be increasingly important to identify energy-efficient means of assuring cost-effective electronic and physical access to the capital city.

POLICY 6.4. TO PROVIDE COST-EFFECTIVE AND ENERGY-EFFICIENT FACILITIES, SYSTEMS AND INFRASTRUCTURE THAT STRENGTHENS JUNEAU'S ROLE AS THE STATE CAPITAL.

Standard Operating Procedure

6.4 - SOP1 Invest in energy-efficient technologies and equipment that provide affordable electronic and physical access to state legislative, courts and other governmental agencies for Alaskan residents.

6.4 - SOP2 The CBJ government must weigh the additional costs of public investment up front with long-term savings over the life of the improvement, and the improvement must at least generate a positive return over its life to be implemented.

Energy Efficient CBJ Buildings and Projects

In addition to keeping costs to Juneau taxpayers as low as possible and conserving energy in general, it is the role of the CBJ government to set an example for businesses and individuals in adopting cost-effective energy saving technologies and operating procedures.

POLICY 6.5. TO INCORPORATE TECHNOLOGIES AND OPERATING PRACTICES THAT W EFFICIENT AND COST EFFECTIVE ENERGY USE INTO ALL OF ITS NEW AND EXISTING BUILDINGS AND ENERGY-USING PROJECTS.

Standard Operating Procedure

6.5 - SOP1 Replace inefficient street lighting and lighting in CBJ-owned buildings and facilities with efficient fixtures upon replacement cycle.

Implementing Actions

6.5 - IA1 Establish and fund a revolving energy conservation investment fund to invest in energy-saving public projects that meet CBJ government return-on-investment criteria.

6.5 - IA2 Invest in necessary metering equipment to produce monthly project energy reports.

6.5 - IA3 Conduct energy audits and establish energy management goals for CBJ-owned buildings.

6.5 - IA4 Develop and implement a system for rewarding CBJ employee initiative and responsibility in good energy management.

6.5 - IA5 Continue to incorporate LEED-Juneau principles and standards when designing public structures and facilities, with appropriate fuel cost sensitivity analyses over the long term life of the Project.

6.5 - IA6 When designing new facilities or major renovation of CBJ-owned facilities, analyze life-cycle costs of energy applications, and use that analysis to guide future development. [see also 6.7 - IA2]

6.5 - IA7 Analyze the workings of CBJ water and wastewater facilities and incorporate energy-saving methods and technologies where appropriate.

6.5 – IA8 CBJ government is to set an example for businesses and individuals in adopting cost-effective energy-saving technologies and operating procedures. Conduct post-improvement analysis of the energy savings. These results should be published as a learning and development tool for the building community.

Maximize Use of Local Energy Resources

Juneau's fossil fuel supply is subject to disruption due to a variety of reasons: embargoes, price hikes, shipping disputes, or disasters, among others. Use of local energy resources reduces these risks. As the Snettisham avalanches of 2008 and 2009 showed, however, dependence on exposed, remote transmission lines for delivering electricity to users exposes the electrical system to unforeseen disruption. Most of the money used to purchase fossil fuels leaves the community. Juneau can have a much healthier local economy if we develop and encourage the use of our own energy resources that are adequately protected from disruption by relatively predictable natural disasters such as avalanches.

POLICY 6.6. TO MAXIMIZE THE RATIO OF LOCAL, RENEWABLE-SOURCE ENERGY TO IMPORTED FOSSIL-SOURCE ENERGY IN JUNEAU'S INTERNAL ENERGY ECONOMY.

STANDARD OPERATING PROCEDURE

6.6 - SOP1 Encourage energy conservation to reduce the amount of money leaving the community to pay for fuels.

Implementing Actions

6.6 - IA1 Seek federal and state funding to convert the CBJ fleet and, particularly, public transit vehicles, to dual-fuel, hybrid, or other fuel technologies with reduced carbon footprints and enhanced sustainability over fossil-fuel burning vehicles.

6.6 - IA2 Where practicable in large industrial operations, encourage co-generation processes to transform by-product heat to electrical energy for use by the operation and adjacent uses or for transmission to a nearby electrical grid.

6.6 - IA3 Where practicable and where there are no significant adverse impacts to marine or other ecosystems, encourage the use of tidal, geothermal, wind, heat pump technologies and other renewable energy sources to generate energy for adjacent uses or for transmission to the electrical grid.

6.6 - IA4 Encourage dual-fuel systems that are cost effective for buildings.

6.6 - IA5 Coordinate with the University of Alaska, other research organizations, and companies to identify potential renewable energy sources to power vehicles, vessels, aircraft, and structures. Analyze both the short- and long-term costs and environmental impacts of energy production and distribution systems giving preference to dependable, cost-competitive, and renewable sources that do not adversely affect natural resources and wildlife habitat when choosing a source of energy.

Maximize Efficient Use of Renewable Energy Resources

In 1995, about 85% of the energy used in Juneau was provided by fossil fuels. By 2010, fossil fuels accounted for only 77% of the total energy consumed in the borough. Conservation and renewable resources could displace much of this fossil fuel and greatly reduce both the dependence on these fuels and the export of capital from Juneau and Alaska.

POLICY 6.7. TO MAXIMIZE THE EFFICIENT USE OF RENEWABLE ENERGY RESOURCES.

Implementing Actions

6.7 - IA1 Coordinate efforts with the University of Alaska and other research organizations and entities to identify potential renewable energy sources to fuel vehicles, vessels, aircraft, structures, and utilities and to heat structures. Analyze both the short- and long-term costs and environmental impacts of energy production and distribution systems and give preference to dependable, cost-competitive, renewable sources that do not adversely impact natural resources and ecosystems when choosing a source of energy.

6.7 - IA2 When designing new facilities or major renovation of CBJ-owned facilities, analyze life-cycle costs of energy applications with consideration of renewable sources given priority. [see also 6.5 – IA6]

Full-Cost Analysis

The very real environmental and social costs, now and in future generations, of relying completely on fossil fuels are not included in the prices paid for fossil fuel-based energy. Wise local and global energy production and use requires that external costs be internalized into energy prices, in order to conserve energy and to encourage its production from renewable, low-impact sources. Additionally, federal, state, and municipal budgets are strained with fewer funds trickling down to the city. Working capital or funds available for investment are therefore a scarce resource not unlike energy. Therefore, careful consideration of impact on the local citizenry must include how redirecting scarce dollars to renewable energy or conservation may have a very real impact. Because national and state policies have not been implemented to do this, the CBJ government should take the initiative to protect the long-term interests of its residents. The exact dollar value of these costs is hard to determine, yet they must not be ignored since they ultimately have a major economic impact on the quality of life.

POLICY 6.8. TO INCLUDE THE FULL COSTS (DIRECT AND INDIRECT) OF ENERGY USE ECONOMIC ANALYSES.

Standard Operating Procedure

6.8 - SOP1 Use quantifiable external and indirect costs in establishing the cost of energy when conducting life-cycle cost analyses of CBJ-owned facilities, projects, and operations.

Implementing Action

6.8 - IA1 Incorporate energy costs, fuel cost volatility, and inflation into scenario analyses conducted as part of long-term energy planning.

Minimize Utility Investment

The peak rate of energy use (peak load) determines the size of generators, transformers, wires, backup generators, and other equipment needed. The cost of these capital investments has a major impact on rates and can be reduced by leveling out energy use on a daily and seasonal basis. Although these improvements are the responsibility of the utility provider and are in response to market forces, the costs of the improvements are paid by rate payers, including the CBJ government. Accordingly, it is the CBJ government's responsibility to support efforts that encourage non-utility private energy investments which reduce the community's financial investment in the electrical system.

POLICY 6.9. TO ENCOURAGE ELECTRICAL ENERGY USE PATTERNS THAT MINIMIZE UTILITY INVESTMENT.

Implementing Action

6.9 - IA1 Work with electrical utility providers and energy developers to develop programs and educational materials promoting energy conservation.

Energy Efficient Buildings

Juneau's maritime climate and comparatively cold winters mean that keeping living spaces warm excessively consume energy if efficient heating, insulating and ventilating practices, materials, equipment and design are not used in the construction of new buildings and in remodeling existing buildings.

POLICY 6.10. TO ENCOURAGE COST EFFECTIVE ENERGY EFFICIENT BUILDING AND REMODELING PRACTICES.

Implementing Actions

6.10 – IA1 Encourage the installation of energy-efficient heating systems in new construction.

6.10 – IA2 Encourage participation in current residential energy efficient mortgage programs and other energy efficiency programs for both new and existing homes and businesses. Encourage favorable lending rate programs for energy efficient multifamily housing and commercial construction or renovation.

6.10 – IA3 Establish energy efficient standards for new and existing buildings and adopt them into local Building Code, CBJ 19.

6.10 - IA4 Encourage the conversion of existing heating systems from fossil fuel to renewable sources of energy.

6.10 – IA5 Consider enacting water conservation ordinances that lead to significant energy savings for the CBJ government, and in turn to utility customers, in pumping water and in treating wastewater.

6.10 – IA6 Encourage consideration of "life cycle" costs, the use of energy efficient construction tech materials, and equipment that are consistent with acceptable health and safety standards and that are appropriate for local climatic conditions, while keeping project costs low.

6.10 – IA7 Consider providing incentives supporting 6.10 – IA6.

Industrial Energy Use

The design and operation of industrial developments can be managed to reduce, transfer, or minimize energy waste and to maximize use of renewable energy. Mining projects tend to be energy intensive and short-lived (tens of years). Within Juneau mining projects could have a great effect on the community's energy economy and be greatly affected by the CBJ energy policy. For industries with large amounts of fuel material by-products (e.g., wood waste), or with high temperature energy by-products (e.g., steam), the generation of electrical energy for sale to the utility grid can be useful and increase overall community energy efficiency. Similarly, there are industries that produce large amounts of heat as a by-product, e.g., over one megawatt thermal, and that could use this energy resource to displace fossil fuel energy in nearby structures for space heating or other low temperature processes. The CBJ government could play a role in making such projects viable, saving considerable energy dollars for use in the community, rather than for export to pay fossil fuel energy costs.

POLICY 6.11. TO ENCOURAGE INDUSTRIAL AND COMMERCIAL USERS TO BE AS EFFICIENT AS POSSIBLE IN THEIR USE OF ENERGY, TO USE RENEWABLE ENERGY SOURCES, AND TO MAKE ENERGY BY-PRODUCTS AVAILABLE FOR USE ELSEWHERE IN THE COMMUNITY.

Implementing Actions

6.11 – IA1 Encourage energy intensive projects to follow adopted CBJ energy policy.

6.11 – IA2 Assist those proposing energy intensive projects in understanding, at the earliest point in their projects, the adopted CBJ energy policy.

6.11 – IA3 Require the use of renewable and environmentally-sensitive energy sources for energy intensive projects, where cost effective.

6.11 – IA4 Encourage the development of co-generated electrical energy at avoided cost.

6.11 – IA5 Encourage appropriate land use patterns of development close to potential sources of surplus by-product heat.

Public Education on Energy

Individual consumer decisions and behavior are significant in governing the extent of required energy development. Nationally, there is a trend toward using rate incentives to further community energy goals. The effect of these incentives is maximized by advising consumers on how to take advantage of them. Only a well-educated citizenry is able to make well-informed decisions.

POLICY 6.12. TO INCREASE PUBLIC UNDERSTANDING OF HOW INDIVIDUAL AND CBJ GO ENERGY DECISIONS AFFECT INDIVIDUAL CONSUMER COSTS, AS WELL AS THE LIVABILITY AND SUSTAINABILITY OF THE COMMUNITY.

Implementing Actions

6.12 – IA1 The CBJ Commission on Sustainability and the Juneau School District should work together to improve energy education in K-12 public school educational curriculum within the Juneau Douglas School District, including:

- energy as a fundamental human need;
- historical perspective of energy;
  understanding our local energy system, and how it fits within the regional, state, federal, and world systems;
- helping students become smart consumers;
- informing future voters on the need to establish and maintain an energy system that is high quality, secure, equitable, and sustainable; and
- a multi-disciplinary approach to energy.

6.12 – IA2 Encourage the private sector, with financial assistance from the CBJ government and support from the Commission on Sustainability, to conduct a public education program to explain the benefits of conservation of energy.

6.12 – IA3 Conduct public meetings to explain and discuss the Energy Chapter of this Plan.

6.12 – IA4 Suggest that the Regulatory Commission of Alaska consider allowing utility providers to charge rate payers for the company's investment in conservation efforts and education on a cost benefit basis.

CHAPTER 7
NATURAL RESOURCES AND HAZARDS

Juneau is situated in a spectacular and varied natural setting. Its aquatic and terrestrial resources not only are of exceptional economic, aesthetic, and recreational value, but also have numerous implications for land use planning and management. In addition to their distinctive characteristics, each resource is interdependent in a complex and often highly sensitive environment.

The CBJ government does not engage in areas of natural resource management that are usually reserved to the state or federal governments, including timber, fish, or game allocation. However, conservation or development of some local natural resources that are now controlled by federal and state agencies, such as fish and wildlife habitat and shorelines, are best managed by local entities. This is true in terms of trying to achieve habitat protection in a way that is sensitive to the rights of landowners as well as to the resource. It is also true because cities have a much broader grant of authority from the state, that of land use control, than do state agencies.

The policies, SOPs, development guidelines and implementing actions that follow are those called for by the citizenry and appropriate to the management of natural resources at the local level through the use of local authority. In some cases, notably wetlands, the CBJ government has taken a highly protective stance and proposed a prominent management role for itself, in part to manage the values these resources represent, but also to conduct wetlands management and regulatory affairs in a manner more sensitive to the needs of land owners and developers than might be the case if wetlands management was left entirely in the hands of state and federal agencies.

NATURAL RESOURCES

Environmental Protection

Juneau is located in a temperate rainforest that has been characterized as one of the world's most beautiful natural settings. Throughout this comprehensive planning process, residents have indicated repeatedly their desire to protect the region's scenic beauty, fish and wildlife habitat and public access to water and forested areas. They also seek to promote the careful management of natural resources while supporting the local fishing, tourism, and recreational activities that depend on the health and vitality of these resources. Through a plan that emphasizes compact development, the CBJ government can mitigate adverse impacts of urban life and provide community sewer and water systems sufficient to protect public health, while avoiding or minimizing harm to the region's surface, groundwater and fish and wildlife resources.

Other sections of the Comprehensive Plan address natural resource issues; these are found in Chapters 9 (Parks, Recreation, Trails and Natural Areas), 11 (Land Use Maps and Subarea Guidelines), and 12 (Public and Private Utilities and Facilities).

POLICY 7.1. TO PROTECT THE REGION'S SCENIC, ENVIRONMENTAL, AND ECONOMICALLY-VALUABLE NATURAL RESOURCES FROM THE ADVERSE IMPACTS OF URBAN DEVELOPMENT. DEVELOPMENT SHALL BE CONTROLLED CAREFULLY AND, IF NECESSARY, PROHIBITED IN NATURALLY HAZARDOUS AND ECOLOGICALLY-PRODUCTIVE OR SENSITIVE AREAS.

Standard Operating Procedure

7.1 - SOP1 Designate on the Comprehensive Plan Land Use Maps areas containing valuable natural resources and/or natural hazards. Provide development standards and controls for those lands to minimize the adverse impacts of urban development and use.

Development Guideline

7.1 - DG1 Care should be taken when clearing land for development to maintain healthy trees and, when selecting which trees to remove, to avoid and mitigate against the effects of "blow down" when trees are removed on one property, creating new wind patterns for adjacent properties, such that mature trees on those lands are blown down by winds.

Implementing Actions

7.1 - IA1 Fund a work program to include adequate staff, equipment, and software to establish and maintain an inventory and electronic map on the CBJ's Geographic Information System (GIS) of high-value delineated wetlands and anadromous fish watercourses within the roaded area.

7.1 - IA2 On the CBJ GIS maps, staff should map the anadromous fish watercourses and high-value wetlands to determine whether lands need to be purchased to create continuous, unfragmented fish and wildlife corridors from the upland forested areas and icefield to the sea. These unfragmented corridors may also be suitable as non-motorized hiking trails.

7.1 - IA3 Collaborate with state and federal agencies to compile and maintain an inventory, a GIS database map of locations, and should develop management plans for all categories of CBJ-owned natural resources such as firewood, sand, and gravel.

7.1 - IA4 Adopt a "dark sky" outdoor lighting code and require adherence to this code in rural areas of the borough, on the road system, from which stars and the aurora borealis can be viewed. Those areas should be protected from glare from outdoor lighting that obscures those sightings.

Coastal Resources Planning

Coastal resources are clearly important to the environmental quality and economic vitality of the community. They provide natural habitat for valued species, recreation, view corridors, food sources, and a sense of well-being for residents and visitors. Environmentally-sensitive habitats and waterfront areas that are particularly subject to intense development pressures, such as downtown Juneau, Auke Bay, North Douglas Island, and Echo Cove, merit special attention.

POLICY 7.2. TO PRESERVE AND PROTECT FISH AND WILDLIFE HABITAT, SCENIC CORRIDORS AND PUBLIC ACCESS TO THE WATER, AS WELL AS WATER-DEPENDENT USES IN PLANNING FOR USE OF COASTAL AREAS.

Implementing Actions

7.2 - IA1 Designate areas for water-dependent uses on the Comprehensive Plan Land Use Maps, the CBJ GIS maps, and the Land Use Code Maps. Identify and designate on these maps publicly-owned shoreline areas that are appropriate for publicly-accessible open space/natural areas or recreational use, for fish and wildlife corridors for fishing and hunting, and/or for view corridors.

7.2 - IA2 Seek expanded authority for the granting of U.S. Army Corps of Engineers Section 404 permits by the CBJ government for wetland areas specified in the Juneau Wetlands Management Plan (JWMP).

Stream Corridors and Lake Shorelines

Stream courses and lakes possess unique ecological, recreational, and scenic values. Portions of the stream corridors also function as floodways and floodplains and protect against erosion of adjacent properties. Development along stream corridors and lake shorelines can destroy their ecological, scenic and recreational values. It also can cause destruction of stream banks, increased runoff, sedimentation and pollution, and increase the danger of flooding to people and property. Carefully designed and sited development that is responsive to the conditions of the site can diminish the potential negative impacts on these ecosystems as well as surrounding land uses, and may be able to actually enhance degraded stream and lake habitat and water quality.

Shoreline values can be maintained and destruction of property from flooding and stream bank erosion minimized by careful management of shoreline development, which primarily takes the form of requiring development to be set back from shorelines of creeks, streams and lakes and to retain or restore natural vegetation. The Land Use Code provides for some basic, or minimum, streamside protection. Additionally, many parcels along the Mendenhall River have been purchased by the CBJ government as greenbelt areas, providing greater protection for these water bodies and habitats. Further efforts are required to protect those and other stream corridors and to coordinate the various management and enhancement activities.

POLICY 7.3. TO PROTECT RIPARIAN HABITAT, INCLUDING STREAM CORRIDORS AND LAKE SHORELINES, FROM ADVERSE EFFECTS OF DEVELOPMENT AND TO PROVIDE A HIGHER LEVEL OF PROTECTION FOR NON-URBAN SHORELINES IN PUBLIC OWNERSHIP.

Development Guidelines

7.3 - DG1 Rivers, streams, and lakes should be managed so as to protect natural vegetation, water quality, fish or wildlife habitat, and natural water flow.

7.3 - DG2 On publicly-owned lands, designated on the Land Use Code Maps as not appropriate for development an area extending 200 feet from the Ordinary High Water Mark (OHWM) of the shorelines or stream corridors of the anadromous fish creeks, streams, and lakes listed in the most recently CBJ-adopted Alaska Department of Fish and Game (ADF&G) inventory of anadromous fish streams.

On CBJ-owned lands that are not designated for disposal in the 1999 CBJ *Land Management Plan*, maintain 200 foot stream buffers from the OHWM of the shorelines of the following anadromous fish streams: Peterson Creek (out-the-road), Shrine Creek, Bridget Creek, Cowee Creek, Davies Creek, Peterson Creek (northwest Douglas Island), Eleven Mile Creek, Middle Creek, and Hilda Creek. This buffer zone or setback may be adjusted or altered, on a case-by-case basis, when a scientific analysis of the specific function(s) of the particular creek's value(s) finds that the setback should be more based on its functional value(s).

7.3 - DG3 On privately-owned lands, require a minimum setback of 50 feet from the OHWM of all creeks, stream corridors and lake shorelines listed in the most recently CBJ-adopted ADF&G inventory of anadromous fish streams. This 50-foot setback is to be considered a basic or minimum setback from the water body and its riparian habitat until a biological functional analysis of the water body and adjacent habitat is conducted that identifies a specific greater or lesser setback distance appropriate to the development and functional value of the particular water body and associated riparian habitat, and an ordinance amending that setback is adopted.

7.3 - DG4 CBJ Community Development Department staff will determine the OHWM on properties subject to development permits. OHWM determinations will be based on habitat and biological considerations according to the adopted OHWM definition in Title 49, the Land Use Code.

Implementing Actions

7.3 – IA1 Fund an effort to develop for adoption into the Land Use Code a riparian habitat protection ordinance that tailors riparian standards to the particular stream-type, functional value and location and which would be consistent with, and complementary to, related Title 49 regulations protecting wetlands, flood zones and coastal areas.

7.3 – IA2 Amend the Land Use Code to update the definition of OHWM as soon as possible.

7.3 – IA3 Investigate the feasibility of providing tax incentives and tax relief for property owners who implement riparian or wetland habitat protection and conservation measures and improvements to their land, such as easements, restoration and assured Best Management Practices (BMPs) maintenance activities.

7.3 – IA4 Require recorded easements on plats and on property records for major developments to provide public access to shorelines and stream corridors, consistent with appropriate statutory and case law.

7.3 – IA5 Give high priority to public acquisition of open space/natural areas and/or public recreation easements to the stream corridor of Pederson Hill Creek (aka "Casa Del Sol Creek") to add to the recent public acquisition of stream corridors of Montana Creek and the west side of the Mendenhall River.

7.3 – IA6 Where development or other causes have led to serious stream bank erosion, undertake programs, in cooperation with other appropriate agencies and private owners, to restore degraded stream banks and prevent further erosion in a manner that provides erosion protection and safe fish habitat.

7.3 – IA7 The Wetlands Review Board (WRB) should advise the Planning Commission regarding direct and cumulative impacts to riparian functions when variances to stream and lakeshore setbacks are requested by Applicants. The WRB should also make recommendations regarding appropriate mitigation measures when such variances are deemed warranted by the WRB and Planning Commission.

7.3 - IA8 Amend the Land Use Code to include additional criteria in the grounds for variance standards that require an evaluation of impacts to habitat and water quality for variance requests from streamside and lakeshore setbacks, and to provide for mitigation when variances to stream or lakeshore setbacks are granted.

7.3 - IA9 The CBJ government should designate publicly-owned shoreline areas along the roaded areas of the borough for public access recreation, stream corridor protection and/or wildlife access protection areas.

7.3 - IA10 Conduct biological functional analyses on streams and adjacent habitat to determine the appropriate setback from each of the following streams for new development on CBJ—owned land: Peterson Creek (out-the-road), Shrine Creek, Bridget Creek, Cowee Creek, Davies Creek, Peterson Creek (northwest Douglas Island), Eleven Mile Creek, Middle Creek, and Hilda Creek. Once the appropriate stream corridor width has been determined for a stream, adopt that stream corridor as a required protection area in the Comprehensive Plan and/or Land Use Code.

POLICY 7.4. TO ADOPT THE MOST RECENT ALASKA DEPARTMENT OF FISH AND GAME (ADF&G) INVENTORY OF ANADROMOUS FISH STREAMS FOR USE IN REVIEWING DEVELOPMENT PROPOSALS ON LAND CONTAINING WATERBODIES.

Implementing Actions

7.4 - IA1 Annually adopt by ordinance or resolution the most recent list of anadromous fish streams pursuant to the ADF&G annual or biannual inventory entitled Waters Important to Spawning, Rearing, or Migration of Anadromous Fishes—Southeastern Region. Update the CBJ's GIS database and mapping layers and the CBJ Open Space Resolution as additions or corrections are made to the list. The CBJ should make the adopted updated list on the city's website.

7.4 - IA2 Concurrently with adoption of the ADF&G annual or biannual inventory of anadromous fish streams in the borough, revise the Land Use Code §49.70.310(a)(4) to state "Within 50 feet of the banks of streams designated as anadromous fish habitat by the most recently CBJ adopted inventory of anadromous fish streams listed by the Alaska Department of Fish and Game."

7.4 - IA3 Revise the CBJ 49, the Land Use Code, to compile all of the requirements for stream and lake shoreline management that are now under Habitat and Wetlands Management and map water bodies and riparian habitat subject to those regulations and guidelines on the CBJ GIS system.

Wetlands

The extensive wetlands in the borough include estuarine areas, freshwater wetlands that may or may not be directly adjacent to a water body, and forested wetlands. Wetlands are defined by the U.S. Army Corps of Engineers (Corps) as areas where the prevalent vegetation is typically adapted for life in saturated soils, where there is water sufficient to saturate the soil during part of the growing season, and where soil conditions indicate that the soil is saturated. Approximately 54 percent of the areas addressed in the *Juneau Wetlands Management Plan* (Mendenhall Valley, Lemon Creek, Auke Bay and North Douglas) were defined as wetlands by the Corps in 1986. Additional wetland areas have been, and continue to be, identified by the Corps and added to the documented inventory of wetlands in the borough.

Wetlands serve important natural and human functions. These include providing fish and wildlife habitat and food sources, storm-water retention, recharge of groundwater, cleaning surface waters by retaining sediment and toxins, flood protection and erosion control, and providing recreational and scenic values to the borough's population.

Prior to 1993, regulation of wetlands management in the borough was primarily the purview of the Corps. To establish a stronger local role in wetlands management, in 1992 the CBJ government adopted the *Juneau Wetlands Management Plan* (JWMP), which:

1. Classifies wetlands based on their environmental functions and community needs (from the higher value Category A and B wetlands, to the lower value Category C and D wetlands);

2. Requires mitigation for development impacts that is appropriate to the environmental value of the wetland;

3. Provides for establishment of a CBJ-administered Wetlands Mitigation Bank; and

4. Provides for local wetlands permitting for lower value wetlands through decisions of the CBJ Wetlands Review Board.

The regulatory provisions of the JWMP and the maps of the wetlands covered under that Plan have been adopted into the CBJ Land Use Code. The Code also established a nine-member CBJ Wetlands Review Board. The Board has also adopted a general wetlands mitigation strategy that recommends that, to mitigate for historic and future impacts to the wetlands inventory in the borough, the CBJ government pursue (1) wetlands protection, (2) public education, and (3) wetlands restoration and creation projects.

The CBJ government worked for many years to obtain a General Permit from the Corps to allow the Wetlands Review Board to assume all responsibility for wetlands permitting on the Category C and D wetlands. In March 1994, the CBJ and Corp signed a cooperative permitting agreement that allowed the CBJ government to conduct its local wetlands permit process for projects in lower value wetlands and in July 1995, the Corps issued the General Permit. In 2011, the General Permit agreement with the Corps of Engineers was not renewed, because the vast majority of C and D wetlands have been filled and the permit authority has not been used. The CBJ government will seek to renew this permit authority with the Corps of Engineers when new Category C and D wetlands are identified in the JWMP update scheduled to begin in 2013.

The Juneau wetlands management program guides the use and protection of our wetland resources. The Land Use Code codifies key portions of the *Juneau Wetlands Management Plan*. The *Comprehensive Plan* serves as the policy backbone for the wetlands regulatory program and addresses issues that can't be addressed solely through regulation of private development.

The 2008 Federal Compensatory Mitigation Rule substantially changed the U.S. Army Corps of Engineers mitigation requirements. In 2009, CBJ re-evaluated its mitigation strategy and the previous goal of creating a wetland mitigation bank. The Assembly and Planning Commission concluded that a mitigation bank was no longer an economical nor practical option for Juneau. Instead, the wetland management and wetland mitigation focus should be re-directed toward an update of the JWMP to identify more low-value Category C and D wetlands. The CBJ government has since received a grant award for a major update of the JWMP. This four-year project will begin in 2013.

POLICY 7.5. TO PROTECT HIGH-VALUE WETLANDS FROM ADVERSE EFFECTS OF DEVELOPM THROUGH LAND USE MANAGEMENT AND TO SPONSOR OR PARTICIPATE IN EFFORTS TO ENHANCE OR RESTORE THE ENVIRONMENTAL VALUES OF WETLANDS IN THE BOROUGH.

Standard Operating Procedures

7.5 - SOP1 Seek acquisition of Category A and EP (enhancement potential) wetlands to CBJ ownership for protection, and for use as wetland mitigation projects, respectively.

7.5 – SOP2 Protect the values of wetlands that have been developed as, or identified as prospective education sites, from impacts caused by adjacent development. Cooperate with public agencies and interest groups in the identification and development of appropriate wetlands interpretive and education sites and facilities.

7.5 – SOP3 Incorporate wetland and stream habitat considerations into the planning, site selection, budgeting, design, construction and operation of CBJ agency projects affecting wetlands and anadromous fish stream corridors.

Development Guidelines

7.5 - DG1 Identify, assess, and consider the cumulative impacts associated with wetland fills while making local wetland management decisions. The JWMP requires that cumulative changes in the wetlands base be considered by the Wetlands Review Board for each local wetland permit issued, as well as during preparation of an annual report on local wetlands management.

7.5 - DG2 Require long-term monitoring of mitigation projects undertaken by CBJ agencies or private parties to ensure that the mitigation measures were undertaken as required by the permit and to ascertain their success.

Implementing Actions

7.5 – IA1 Update existing maps and expand the coverage of the JWMP to include wetlands identified by the Corps since 1986 (the date of the Corps' maps used as the basis for the JWMP), particularly forested wetlands. Extend the wetland classification system to these wetlands and include lower value wetlands under a General Permit, as appropriate under the Corps' requirements for General Permits.

7.5 - IA2 Provide mechanisms to facilitate protection of high value privately-owned wetlands, such as through conservation easements and tax reductions.

7.5 - IA3 Take appropriate administrative actions to protect high-value wetlands on public lands, such as formally designating greenbelts along selected anadromous fish streams.

7.5 - IA4 For Category A and B and other high-value wetlands on private lands, provide for the consideration of the wetlands classification and any history of development permit denials during property tax calculations conducted by the CBJ Assessor.

7.5 - IA5 Provide flexibility in residential and non-residential development standards, including density standards, to allow developments to be designed to minimize impacts to wetlands and stream habitats, such as through cluster development, transfer of development rights to select receiving areas, and conservation easements.

7.5 - IA6 Develop and maintain a computer database and GIS mapping capability to map and track locally-issued permits, wetlands acreage developed under CBJ permits, mitigation required, mitigation success, and enforcement actions.

7.5 - IA7 Assure adequate staffing in CDD to monitor enforcement of mitigation measures and plans to ensure that projects comply with approved plans and conditions placed on local wetland permits. Work actively to enforce violations.

7.5 – IA8 Update the *Juneau Wetlands Management Plan* and Implementation Program to:

A. Clarify and strengthen the regulations for high value wetlands;

B. Increase permit predictability to wetlands owners,

C. As much as is practicable, to make CBJ valuation methodologies and classifications consistent with those of relevant state and federal agencies and the Army Corps of Engineers; and

D. Update existing wetland maps and expand the geographic areas of the wetlands inventory and delineation area to include the areas included in the Urban Service Area, identified in this *Comprehensive Plan* Update, for new development to the year 2033.

POLICY 7.6. TO RETAIN ALL CBJ-OWNED CATEGORY A AND B WETLANDS IN CBJ OWNERSHIP AND TO MANAGE THEM FOR ENVIRONMENTAL PROTECTION AND PUBLIC EDUCATION. HOWEVER, WHEN DEVELOPMENT OF SUCH WETLANDS HAS BEEN DEEMED BY THE CBJ ASSEMBLY AS NECESSARY FOR THE OVERALL HEALTH, SAFETY, AND/OR WELL-BEING OF THE COMMUNITY, SUCH DEVELOPMENT MAY OCCUR WHEN ADEQUATE MITIGATION OF THE LOSS OF SUCH WETLANDS IS PROVIDED.

Implementing Action

7.6 - IA1 Identify select degraded wetlands on CBJ lands or on private property with portions of impaired anadromous fish streams as receiving or target restoration lands, water bodies and resources for Mitigation Bank purposes.

Water Quality

Within the borough, significant sources of adverse impacts to water quality are "non-point sources" of pollution to surface and groundwater resources. Non-point sources are broad, diffuse sources of pollution or activities that release harmful wastes by being spilled, leaked, leached, eroded, or dumped onto land or into the water. Non-point source pollutants can include soil sediment, hydrocarbons, fecal coliform bacteria, heavy metals, and other pollutants that are generated through stream bank or upland erosion, urban runoff, off-site sewage system leach-fields, and other common features of our urban and rural landscapes.

These non-point sources are distinct from "point sources" of pollution that are traceable to distinct operations or activities that include manufacturing, industrial activities, and large private and public facilities such as waste water treatment plants. These point sources are currently managed by Federal Environmental Protection Agency (EPA) and State of Alaska Department of Environmental Conservation (DEC) permits.

To effectively protect water quality, the CBJ must control non-point source pollutant sources primarily through land use controls and Best Management Practices (BMPs) applied to development projects and business operations during the permitting process. Non-point source controls and BMPs affect where a development is located, and how it is constructed and operated. Examples of these controls include selecting a project site that is over 50 feet from open water or that avoids wetlands; placing siltation fences around construction sites; constructing a retaining dike around fuel storage or fueling areas; installing an oil/water separator on storm drains for roads and parking lots; and/or careful storage of snow near drainage systems or anadromous fish streams.

Failure of on-site waste water systems at times has required that the CBJ government to remedy unsafe situations at great expense to taxpayers. It is estimated that extending sewer systems to rural areas requires local taxpayers to subsidize about 80 percent of the costs of these improvements.

Since 1988, the provision of public sewer utilities to additional areas within the Mendenhall Valley (Mendenhall Loop Road) and North Douglas areas has helped to resolve localized surface and groundwater quality problems formerly caused by failed on-site septic systems. Even more recent sewer service extension to the Industrial Boulevard and additional North Douglas areas will further reduce on-site sewage treatment and the potential for water quality impacts.

The Federal Clean Water Act requires that every two years the Alaska Department of Environmental Conservation (DEC) identify, rank, and assess water bodies with persistent water quality problems. Impaired waters, for which conventional technology-based water quality controls are not expected to bring the water quality into compliance with state water quality standards, may be subject to Total Maximum Daily Load (TMDL) allocations for pollutants. This means that DEC determines the maximum amount of various pollutants that can be in the stream without violating water quality standards, and allocate a proportion of that pollutant load to each pollutant source. This type of allocation process can result in extremely stringent development controls in TMDL watersheds.

DEC continues to review water bodies that fail to meet state water quality standards. The list of impaired water bodies is updated every two years. Table 3 lists the five 2011-designated impaired water bodies within the City and Borough of Juneau.

The CBJ government has entered into a Memorandum of Agreement (MOA) with DEC to cooperate in preparing water quality assessments and watershed recovery plans. The mutual goal is to improve the water quality in these listed streams such that they will comply with state water quality standards and be removed from the impaired listing. It is essential that effective plans be implemented to improve the water quality in the impaired streams--both to improve our natural water resources and the fisheries that they support, as well as to avoid the extremely restrictive development controls that the Federal Clean Water Act will impose if the impairment is not remedied.

Given these important water quality issues, it is appropriate to address them in a comprehensive planning and land use management context.

IMPAIRED WATER BODIES WITHIN THE CITY & BOROUGH OF JUNEAU, 2011

Water Body	*Impaired Cateogry*	*Pollutants*	*Sources*
Duck Creek	4a	Dissolved oxygen, debris, metals, fecal coliform, habitat modification, turbidity	Urban runoff, landfill, road runoff, land development
Jordan Creek	4a	Residues, Dissolved gas and sediment	Urban runoff
Lemon Creek	4a	Turbidity, sediment, habitat modification debris	Urban runoff, gravel mining
Pederson Hill Creek (aka Casa del Sol Creek)	4a	Turbidity, fecal coliform, petroleum products, habitat modification, sediment	Urban runoff, failing on-site waste water systems
Vanderbilt Creek	4a	Turbidity, debris, sediment, habitat modification	Urban runoff

Table 7.1

Stormwater Management

Non-point source pollutants are carried from their source to the streams by stormwater. Stormwater is the water from rainfall or snow melt that flows across the land surface to a receiving water body. From the point on which it hits the land, it travels a course that eventually leads to streams or lakes and eventually to the ocean. As the water moves across the land, it dislodges and picks up sediment and pollutants. Stormwater management is the control of these pollutants before they enter the stream systems. It is also an effort to reduce erosion, which in turn decreases the amount of sediment entering and filling the streams. The goal of stormwater management is to

filter out as many of the pollutants and sediments from the stormwater before they enter the rece and to reduce erosion and pollutants. Natural stream bank buffers, riparian vegetation and wetlands are excellent storm water purifiers and excel in removal and assimilation of sediments and pollutants.

Any activity that alters the natural vegetation and features of the land surface tends to alter the stormwater runoff characteristics. Traditionally, urban development has been the largest factor in increased stormwater runoff problems. The problems are directly tied to runoff quality, quantity and velocity. Methods employed to increase percolation of surface water into the ground will reduce the amount and speed of flow when it enters the streams. Likewise, natural or mechanical filtering of the water before it enters the streams helps improve the water quality and, thus, helps protect the habitat.

Stormwater runoff from urban development and construction sites is one of the leading contributors of degradation of water quality and habitat in streams and lakes nationwide.

In the past, the CBJ government has made an effort to reduce stormwater pollutants and sedimentation on a case-by-case basis. However, there are currently five streams that are listed by DEC as impaired water bodies in the borough, and more effective methods and procedures are necessary in order to address this problem.

POLICY 7.7. TO PROTECT, MAINTAIN AND IMPROVE SURFACE WATER, GROUNDWATER AND MARINE WATER QUALITY IN ITS JURISDICTION SO THAT ALL WATERS ARE IN COMPLIANCE WITH FEDERAL AND STATE WATER QUALITY STANDARDS AND CONTINUE TO ALLOW AQUATIC LIFE TO THRIVE.

Standard Operating Procedures

7.7 - SOP1 Coordinate the various *Comprehensive Plan* sections that affect water quality (stream management, wetlands, domestic watersheds, open space/natural areas) to ensure that implementing actions protect and maintain surface and groundwater quality.

7.7 - SOP2 Participate with the State of Alaska Department of Environmental Conservation (DEC), the federal Environmental Protection Agency (EPA), and other relevant regulatory organizations in the development and implementation of water body management and recovery plans for the listed impaired water bodies within the City and Borough of Juneau, including use of Best Management Practices for protection and improvement of water quality.

7.7 - SOP3 Coordinate with relevant regulatory organizations when reviewing projects for local approvals (e.g., subdivisions, land use permits, variances), planning CBJ projects (e.g., gravel mining, land disposals), or conducting enforcement in the impaired watersheds.

7.7 - SOP4 Cooperate with relevant regulatory organizations in monitoring permit conditions, permit compliance and watershed restoration in impaired water bodies.

7.7 - SOP5 Incorporate the goal of protecting and improving water quality into the planning, site selection, budgeting, design, and construction of CBJ government- and state-sponsored capital projects with consideration of watershed management plans when available.

7.7 - SOP6 Consult with private landowners, industry, and the public, including groups such as the Juneau Watershed Partnership, regarding cooperative approaches to improving water quality in the impaired watersheds.

Development Guideline

7.7 - DG1 Ensure that stream corridors, surface waters, and associated riparian buffer areas receive greater attention in the local permitting process through adherence to the most recent version of the CBJ *Manual of Stormwater Best Management Practices* (BMPs) and adoption of additional requirements or criteria that protect these areas and waters if needed. One of those BMPs is the appropriate removal and storage of snow in residential subdivisions and commercial developments. Snow should be stored away from streams, preferably in upland areas where good vegetation will trap excess sediment before entering stormwater systems or waterways. This is particularly important where large surface areas are plowed, such as on airport property or parking lots near anadromous fish streams.

Implementing Actions

7.7 - IA1 Provide snow storage areas throughout the Urban Service Area, each containing a filter settling basin to reduce the amount of sediment entering local drainage systems and water bodies.

7.7 - IA2 Map the impaired watershed areas and their associated drainage systems on the CBJ GIS system and the Land Use Code Maps to ensure that they are accorded special attention when reviewing permit applications.

7.7 - IA3 Coordinate with relevant regulatory organizations in the development and implementation of water body management and recovery plans for the listed impaired water bodies within the borough, including use of Best Management Practices for protection and improvement of water quality.

7.7- 1A4 During the permit process, educate private property owners about Best Management Practices related to snow storage, and help define snow storage areas within private properties.

Watersheds

Water supplies for domestic uses in Juneau are a limited resource. The existing domestic water sources are the Gold Creek/Last Chance Basin and the Salmon Creek watersheds. The *Watershed Control Program—Salmon Creek Source* (1993), and the *Watershed Control and Wellhead Protection Program—Gold Creek Source* (1994) were adopted as part of the CBJ *Comprehensive Plan* to provide guidelines for the protection of the domestic water supply. In addition, the *1994 Update—Last Chance Basin Land Management Plan*, which guides land use activities for the protection of the Gold Creek water source, was also adopted by the CBJ. The 2012 *DRAFT AJ Mine Related Water Study* discusses the status of the Gold Creek water source in 2011-12 and investigates potential system improvements, including other drinking water sources.

Steps must be taken to assure that sufficient high-quality water will be available for future domestic users. Existing and potential sources should be protected from degradation of quality and quantity. Of particular concern is the long-term availability of potable water for future growth areas in Auke Bay, the Mendenhall Valley and on Douglas Island.

POLICY 7.8. TO PROTECT WATERSHED AREAS THAT ARE, OR POTENTIALLY COULD BE, DEVELOPED FOR DOMESTIC WATER SUPPLIES TO PROVIDE AN ADEQUATE SUPPLY OF CLEAN, SAFE DRINKING WATER.

Standard Operating Procedures

7.8 - SOP1 Evaluate the potential of local watersheds for surface or groundwater development of municipal water supplies.

7.8 - SOP2 Implement the *Watershed Control and Wellhead Program–Gold Creek Source* (1994), the *Watershed Control and Wellhead Program–Salmon Creek Source* (1993) and the *1994 Update—Last Chance Basin Land Management Plan* for the protection of Juneau's municipal water supply.

7.8 - SOP3 Certain lands within the borough serve as watersheds for potable water supplies and/or potential potable water supplies. The CBJ government should continue to designate those lands as Watershed protection areas on the Land Use Maps of the *Comprehensive Plan* and should limit and control development therein.

Development Guidelines

7.8 - DG1 Regulate all development proposals and major activities in watershed areas that have high potential for development as a municipal water source to ensure maintenance of high quality water. Regulate direct discharge from storm-water control devices into designated watershed areas.

7.8 - DG2 Prohibit filling or draining of wetlands, bogs and muskegs in designated watersh areas if it is shown that such activity could result in degradation of water quality.

7.8 - DG3 Only permit development that would not result in degradation of water quality.

Implementing Actions

7.8 - IA1 In order to protect water quality in watershed areas:

1. Establish Best Management Practices (BMPs) for land use activities permitted within the watershed protection areas that would prevent or mitigate degradation of the watershed habitat or surface or ground water quality from the use of pesticides, fertilizers or other chemicals;

2. The introduction or maintenance of invasive species should be prevented by the prohibition of sale or importation of such species, particularly in seed mix associated with ground stabilization projects; and,

3. Plant retailer and suppliers; contractors; property owners; the CBJ, state, and federal governments; and organizations such as the Alaska Association of Conservation Districts which work directly on eradication and control of invasives should post notices and illustrations for the public to understand which plant species are invasive and how to properly eradicate them.

7.8 - IA2 Support an effort to map those portions of watersheds that could be a source for domestic water in the CBJ GIS system and adopt appropriate protections for those new watersheds. Development of new water sources for West Douglas Island will need to progress with development of the West Douglas New Growth Areas; other new water sources, particularly for Auke Bay, the Mendenhall Valley, and North Douglas will likely be required after 2025.

7.8 - IA3 The City Manager should assign a CBJ agency or division to monitor water quality, particularly within watersheds, and coordinate enforcement activities with state and federal land management and regulatory agencies.

Air Quality

Air quality refers to the quality or purity of the air we breathe, the quality of the air we see and see through, as well as the absence of harmful, nuisance or annoying sounds or odors that are transmitted through the air.

Although breathable and visible air quality in the CBJ area has generally been high, it can be a serious problem in some areas of concentrated burning of fire places, wood-stoves, outdoor burning of refuse, and the increase of engine emissions from vehicles, cruise ships and aircraft. The Mendenhall and Lemon Creek Valleys are the areas most seriously affected by breathable air pollution, due to air inversions during the winter months. The CBJ has adopted air quality control regulations that prohibit wood-stove burning during periods of poor air quality, provide for emission standards for new wood-stoves, prohibit open burning during the winter, and require construction of energy- efficient single-family homes. The CBJ has also enacted laws to regulate open burning. Another significant effort being made to assure compliance with air quality regulations is through the program to pave residential streets to control dust. As a result of these efforts, the CBJ's air quality is relatively good most of the time.

Noise is a significant problem during the summer season when flightseeing aircraft pass above public waterways, parks, trails, and residential areas. The volunteer Tourism Best Management Practices Program (TBMP) seeks to minimize noise impacts from float planes and helicopters, but noise impacts from these non-stationary sources are difficult to control and whether the noise is noticeable, annoying or a nuisance is subjective, and varies from person to person and situation to situation. In neighborhood outreach meetings in the Douglas Island and Mendenhall Valley areas as part of the 2009 Plan Update, residents testified that the noise from numerous flightseeing aircraft during the summer remains annoying despite the efforts of the TBMP. Similarly, commercial kennel facilities are difficult to locate due to noise from barking dogs. In dense, urban areas such as downtown Juneau, some residents complain of noise from stationary sources such as adjacent or nearby commercial cooler and air conditioning units that click on and off 24-hours a day.

Overall, it is appropriate for the CBJ government and community to remain concerned with air quality, including noise levels.

POLICY 7.9. TO CONTINUE EDUCATIONAL PROGRAMS, CAPITAL IMPROVEMENT PROJECTS, A REGULATORY MEASURES TO PROTECT AND IMPROVE OVERALL AIR QUALITY.

Standard Operating Procedure

7.9 - SOP1 Cooperate with the Alaska Department of Environmental Conservation (DEC) in implementing CBJ 36.40 regarding regulation of pollution from wood stoves and outdoor burning.

Implementing Actions

7.9 - IA1 Undertake public transit improvements to reduce congestion and encourage residents to utilize non-fossil-fuel dependent forms of transportation. This would include replacing public and private bus fleets with vehicles that operate on non-fossil fuels, such as batteries that can be recharged with renewable energy sources.

7.9 - IA2 Establish a CBJ agency or Division within an existing Department that would monitor air quality and would work with state and federal regulatory agencies and stay abreast of air quality issues, concerns and technology.

7.9 - IA3 Consider establishing limits on, or otherwise regulating, CO2 emissions in the borough.

Noise

An increasing problem in Juneau, the most significant sources of noise are: the airport; flightseeing operations throughout the borough, but especially near heliports and at the downtown seaplane base; gravel quarrying; loading and unloading activities at marine transfer stations; and vehicle traffic. Other noise sources include stationary equipment such as machine motors, parties, car alarms, barking dogs, fireworks, shooting, snow removal, refuse pick-up, and even children playing outside can be annoying depending on the sensitivity of the observer, the time of day, and the context of the noise. Noise is any objectionable, annoying, nuisance or harmful sound, although it is subjective to the receptor (person). The absence of noise, characterized as "peace and quiet," has become a recognized asset and value to community well-being. Some significant advances are being made in the reduction of noise at its source, but noise cannot be eliminated completely. Local, state, and federal agencies, in recognition of this fact, have developed guidelines and procedures to deal with noise in the community land use planning process.

The purpose of considering noise in a comprehensive plan and in the regulation of development is not to prevent development but to encourage development in locations that are compatible with various noise levels. The objective is to guide noise-sensitive land uses away from noise sources and to place tolerant land uses where there is noise. For example, homes, schools and hospitals should not be located near airports, but industrial uses are typically not adverse to aircraft noise. Where this separation of compatible and non-compatible land uses is not possible, measures should be included in development projects to reduce the effects of noise. For example, office buildings located within or near aircraft noise contour areas should be constructed with air conditioning and double- or triple-paned windows, rather than single-paned, operable windows for ventilation.

The primary responsibility for integrating noise consideration into the planning process rests with local government. Noise, like soil conditions, floodplains and other considerations, is a valid land use determinant. Scientific evidence clearly points to noise as not simply a nuisance but also an important health and welfare concern.

POLICY 7.10. TO MINIMIZE THE EXPOSURE OF RESIDENTS TO THE HARMFUL EFFECTS OF EXCESSIVE AND/OR OBTRUSIVE NOISE, AND TO CONTROL THE LEVEL OF NOISE POLLUTION IN A MANNER THAT WILL BE COMPATIBLE WITH COMMERCE AND PUBLIC SAFETY, THE USE, VALUE, AND ENJOYMENT OF PROPERTY, SLEEP AND REPOSE, AND THE QUALITY OF THE ENVIRONMENT.

Standard Operating Procedures

7.10 - SOP1 Establish land use patterns that minimize the effects of high-noise generators, particularly in the airport vicinity or near other aircraft landing facilities, near industrial zones, along major traffic corridors, near shooting ranges and off-road-vehicle tracks, and other similar noisy environments.

7.10 - SOP2 Consider noise mitigation when reviewing new roadway improvements. Require berms, sound walls and/or planting strips along highways and major arterials in noise sensitive areas where the CBJ owns the roadway. Encourage the Alaska Department of Transportation and Public Facilities (ADOT&PF) to leave or provide dense vegetation along state roadways through residential areas to absorb traffic noise and dust.

7.10 - SOP3 Provide leadership in implementing the CBJ "Fly Neighborly Program," an aircraft operator-supported, self-policing program intended to observe and improve an existing voluntary noise abatement program. Should this volunteer program not satisfy noise concerns of the public, a local noise control ordinance should be developed to require mandatory controls and measurable and enforced mitigation measures per 7.10 -IA1.

Implementing Actions

7.10 - IA1 Adopt a Borough-wide and/or subarea-specific noise ordinance(s) to provide a mechanism for addressing noise complaints and to ensure that new development does not result in noise complaints.

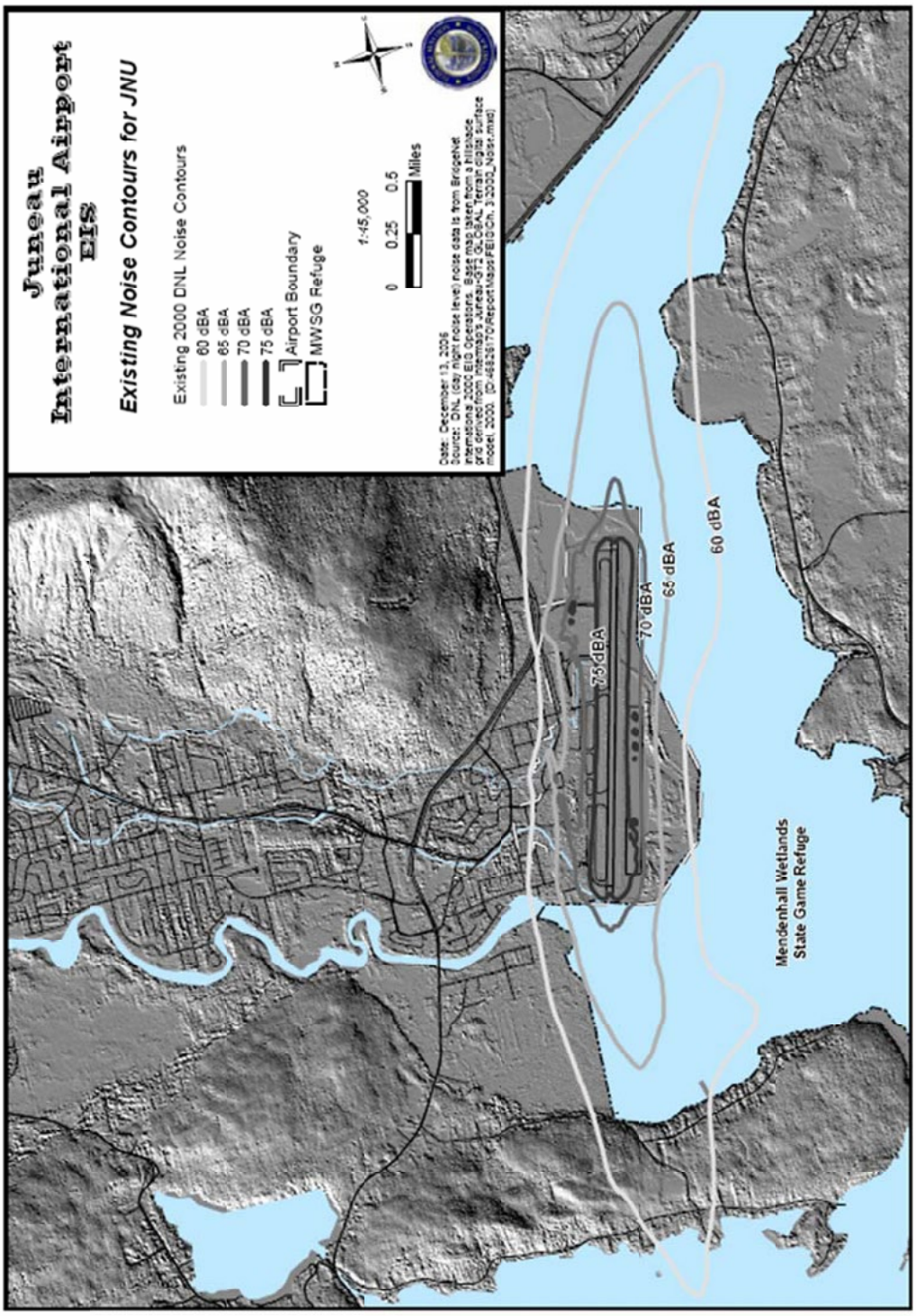
7.10 - IA2 Adopt the guidelines developed in the *Juneau International Airport Master Plan* into the Land Use Code to manage aircraft--generated and airport-related noise impacts on surrounding development, consistent with Federal Aviation Administration (FAA) regulations and local regulations.

7.10 - IA3 Consider establishing a new Noise Notification Overlay District that encompasses lands near enough to be affected by uses known to generate nuisance noise, such as: gravel extraction areas, landfill sites, outdoor shooting ranges, airports and heliports. Within this overlay district, property owners should be required to notify prospective tenants and/or purchasers of the presence of these land uses and their potential noise impacts. Also consider amending Title 19, the Building Code, to require adequate noise mitigation in building design and construction within this overlay district.

7.10 - IA4 Establish special noise attenuation features in the local building code for new construction of habitable structures within areas demonstrating high ambient noise levels of, such that habitable buildings are constructed with materials and by design to attain an interior noise level considered safe and healthy.

7.10 - IA5 Initiate development of a Borough-wide or subarea-specific noise control ordinance when noise complaints or other indicators indicate increasing noise pollution and/or community sensitivity to nuisance noise. Such a specific-area noise control ordinance should establish maximum environmental noise levels applicable within designated areas of the CBJ for both stationary (typically equipment, sound systems) and non-stationary noise sources (typically vehicles, human or animal noise).

AIRPORT NOISE CONTOUR MAP*



Map 7.1

Source: Juneau International Airport FEIS, Figure 3-3 *This map does not show the expanded Runway Safety Area or its effects on the Noise Contour. Higher noise contours exist to the east and west of the airport.

Habitat Protection

The forests, wetlands, lakes, streams and marine waters within the City and Borough of Juneau are part of a habitat network for fish and wildlife. Each of these areas supports a unique variety of animals. Urbanization often results in habitat fragmentation and degradation, causing long-term damage to animal populations.

The major aquatic habitat types in the borough are: coastal marine waters, intertidal flats, estuaries, fresh and saltwater wetlands, creeks, rivers and lakes. These areas contain critical spawning and rearing habitat for many marine species, including salmon, trout, char, herring, halibut, rockfish, clams, mussels, and crab, not to mention the invertebrates, macro-invertebrates, and other species upon which they depend for food.

Historic development has been accompanied by grading, filling and channeling of waterways, interception and alteration of ground and surface waters, and pollution of the waterways and adjacent riparian habitat. This has caused the degradation of streams and fish resources in the CBJ area. Among the streams most seriously affected, and listed as impaired by the State of Alaska Department of Environmental Conservation (DEC), are Duck, Lemon, Jordan, Vanderbilt and Pederson Hill (aka Casa del Sol) Creeks. Those that retain important fish resource values are listed in the CBJ-adopted list of Anadromous Fish Streams and include, among others, the creeks, rivers and lakes with anadromous fishery resources of Cowee, Bridget, Peterson, Tee, Lena, Auke Nu, Waydelich, Auke, Bay, Lake, Montana, McGinnis, Switzer, Lemon, Salmon, Falls, Fish, Windfall, Lake, Steep, Sheep, Neilsen, Grant, Eagle, Kowee, Lawson, Bear, Ready Bullion, Bullion, Nevada, Middle, Hilda, and Petersen Creeks, the Mendenhall, Herbert, and Eagle Rivers, and other named and unnamed creeks.

A prevalent upland habitat type in the borough is the coniferous forest; it also is an important economic asset to the region. Much of this forest habitat is within the Tongass National Forest and is controlled by the U.S. Forest Service. The location and scale of timber harvest can affect the type and amount of fish and wildlife habitat.

Sitka Black-tailed Deer is an important game species whose populations are limited by the availability of wintering habitat. Optimal wintering areas, which are predominantly located in portions of old growth forests, have been identified on Douglas Island and around Lemon Creek. The loss of wintering habitat or the intrusion of human activities and domestic animals lowers the maximum deer population that can be sustained. Two other species, Stellar sea lions and Bald Eagles, have unique requirements because of the Marine Mammal Protection Act, the Endangered Species Act (Stellar sea lions), the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act (Bald Eagles). They are therefore treated separately following this section, as are bears.

In addition to their ecological importance, and in some instances to their value as food sources, fish and wildlife populations of the borough are an important natural amenity valued by residents and visitors alike. Some species, such as salmon and herring, are deemed “indicator” and/or “keystone” species and warrant extra attention by regulatory and management agencies. Indicator species populations are easily and routinely monitored; changes to their population over time provide an indication of the health of their entire ecosystem. Herring and salmon can both be considered indicator species because their populations are monitored by the Alaska Department of Fish & Game on a regular basis, and as middle-level predators, their populations can indicate the health of the entire ecosystem. Keystone species are crucial to the health of the entire ecosystem; many other species in the ecosystem depend on keystone species to survive, directly or indirectly. Herring are a keystone species in the Inside Passage, because many predators depend on them for food.

Monitoring the health and viability of the habitat of the indicator species, particularly the spawning habitat, will guide us in developing specific interventions to avoid or minimize harmful impacts to that habitat (such as the use of Best Management Practices); this, in turn, will benefit all the species that use that habitat. As herring are both a keystone and an indicator species in Juneau, protecting their habitat is of great importance to the ecosystem as a whole and to the economy of the borough and the Southeast Alaska region due to their relationship with other commercially-harvested species.

Even simple Best Management Practices (BMPs), such as avoiding the introduction and pursuing the eradication of invasive plant species in our yards and gardens, can be critical in protecting the health of our environment.

POLICY 7.11. TO PRESERVE AND PROTECT A DIVERSITY OF FISH AND WILDLIFE HABITAT THROUGHOUT THE CBJ.

Standard Operating Procedure

7.11 - SOP1 Urge property owners to protect fish and wildlife habitats, streams and wetlands when designing development projects. Encourage clustering, buffer zones, conservation easements and other design alternatives that could protect fish and wildlife habitat.

7.11 - SOP2 Include protection of important fish and wildlife habitats in Capital Improvement Programs and land use planning.

7.11 - SOP3 Consult with DEC, ADF&G, NMFS, and any other potentially interested state or federal resource agency in drafting land use regulations and plans, as well as in permit review for any development that could impact fish or wildlife habitat. Be especially deferential to agency comments on draft regulations, plans, or development permits that could affect herring spawning areas, especially along the east shore of Lynn Canal, Auke Bay, and Gastineau Channel.

Implementing Actions

7.11 - IA1 Develop a GIS database to identify natural resources, fish and wildlife habitats, riparian corridors and wetlands. Develop a GIS-based Critical Wildlife Habitat map in cooperation with the Alaska Department of Fish and Game, the Fish and Wildlife Service, and the U.S. Forest Service as an overlay to the Land Use Code maps. Use this map as a guide in managing and protecting these areas and in identifying un-fragmented fish and wildlife corridors aligned along anadromous fish streams from the icefield to the sea.

7.11 - IA2 Protect important fish and wildlife habitat and assure fauna's access to quality habitat, using a wide variety of tools, including but not limited to: education, incentives (such as conservation easements and tax abatement), development regulations, private donations, tax reductions on lands with conservation easements, or public acquisition. Vary the use of management techniques based upon the size, location, vulnerability, and relative abundance of the fish and wildlife habitat.

Invasive Species

The CBJ, along with state and federal resource agencies and local non-profit organizations, has established a Juneau Cooperative Weed Management Area (JCWMA) to cooperatively address the rapidly escalating invasive species problem in Juneau. The JCWMA has established an ABC list of 20 invasive plants which have been ranked according to the extent of the weed infestation, how rapidly the weed spreads, and the availability of practical measures to bring the infestation under control. Some species have been targeted for prevention or control, while other species have been targeted for full eradication. Invasive species may have serious economic effects as well as biological effects. For example, reed canary grass has destroyed salmon runs in other areas of Alaska by choking the streambed with excessive growth. If left unchecked, invasive species could negatively impact the fishing, tourism, and recreation industries, in addition to aesthetic damage to local parks and trails. The top ten invasive species in Juneau, according to the JCWMA, are: bohemian knotweed, Japanese knotweed, purple loosestrife, reed canary grass, ornamental jewelweed, orange hawkweed, yellow-meadow hawkweed, Canada thistle, European bird cherry, and bird vetch.

POLICY 7.12. TO PROTECT LOCAL BIODIVERSITY, INCLUDING NATIVE FLORA AND FAUNA, FROM INVASIVE SPECIES.

Implementing Actions

7.12 - IA1 The CBJ government should fund or otherwise support a study of the effects of climate change on the potential for invasive species to immigrate to and thrive in the borough, to the detriment of native species. If this study identifies potential harmful effects of invasive species, the CBJ government and community should undertake aggressive measures to prevent and eliminate this infestation hazard.

7.12 - IA2 The CBJ should fund or help fund a Borough-wide study of invasive plants to pro inventory and maps of existing locations of invasive plants on, at least, CBJ-owned lands. This study should include the following elements: (1) development of a priority list of invasive plant species to be targeted for control and eradication throughout the CBJ and a five to ten year plan for achieving that goal; (2) development of a CBJ team within an existing Department or to a contracted non-profit group to coordinate the implementation of that eradication program; (3) development of a prevention plan to identify and address sources of invasive plant species; (4) development and implementation of a public education program to promote awareness of the impacts of and methods to eradicate invasive plant species and to urge retailers not to sell invasive species or to prohibit them from selling them; (5) development of new land use controls to require private property owners to eradicate, or to prevent introduction of invasive species on their property as part of review and approval of new building or grading permits; and (6) designation of a secure site and procedures for safe disposal of pulled or cut invasive species.

Stellar Sea Lion Habitat

The Stellar sea lion, while apparently healthy in Southeast Alaska, has been listed as threatened in Alaska. Benjamin Island, in Favorite Channel between the Eagle River and Bridget Cove, is a major Stellar sea lion haul-out. The island has supported as many as 227 sea lions at one time, according to the 1991 Recovery Plan for the Stellar sea lion prepared by the National Marine Fisheries Service. The primary sea lion haul-out is on the northwest shore of Benjamin Island; however, sea lions use the entire periphery of the island. Major haul-outs such as that on Benjamin Island are considered critical habitat for the species. It is one of only 19 known major (supporting over 200 sea lions) sea lion haul-outs in Southeast Alaska. The site is a popular local sea lion viewing destination and is of growing interest to visitors. Stellar sea lions consume seasonal prey, such as herring, cod, salmon and eulachon, as well as year-round prey, such as pollock, cephalopods, mackerel, flounder, rock sole and sand lance. Threats to the mammal include intentional killings by fishermen, competition with commercial fisheries resulting in reduced prey from over-fishing, toxic substances in sea water and prey, ingestion of fishing tackle and other debris, disturbance of fishing areas and rookeries by vessel traffic and tourism, and predation by killer whales.

POLICY 7.13. TO PROTECT AND PRESERVE THE AREAS ON BENJAMIN ISLAND IDENTIFIED AS CRITICAL STELLAR SEA LION HABITAT.

Standard Operating Procedure

7.13 - SOP1 Consult with the National Marine Fisheries Service (NMFS) on all development proposals, including commercial marine and aircraft fish and wildlife viewing that could affect sea lions' use of the island.

Development Guideline

7.13 - DG1 Consult with the NMFS and prohibit development that would interfere with critical sea lion habitat including their haul out.

Implementing Action

7.13 - IA1 Identify on the CBJ GIS and Land Use Code Maps the publicly and privately-owned land and water areas identified as critical sea lion habitat in the *Stellar Sea Lion Recovery Plan* published by the NMFS.

Eagle Nesting Areas

Bald eagles are present in the CBJ area in large numbers. Alaskan bald eagles are not an endangered or threatened species, but they are subject to the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act of 1918. Shoreline areas and old growth forest habitat are prime nesting areas. The U.S. Fish and Wildlife Service (USFWS) recommends a non-buildable buffer zone of at least 330 feet around known eagle nests and retention of shoreline habitat in this vicinity to a depth of one-eighth mile, although certain development activities can occur within the 330-foot buffer zone without risk of violating either federal act, if care is taken in those activities. In 2011, the USFWS started issuing permits that allow disturbance of bald eagles, including the destruction of nests in some instances.

Locally, adequate protection can be given to this species by protecting nesting areas from conflicting la and human activity. An ordinance protecting eagle nests has been codified in the Land Use Code and prohibits construction within 330 feet of an active nest on public land, or within 50 feet of an active nest on private land, provided that there is no construction within 330 feet of such nest between March 1st and August 31st if it contains actively nesting eagles. It may be appropriate to revise this ordinance, in light of changes to federal policy regarding disturbance of eagles.

There is a generally held perception that the local population of bald eagles is increasing which, if true, may be attributable to an increase in fish in the area and/or a higher-than-expected tolerance of these birds to human presence. In any case, the eagles are still subject to special protection by law and enjoy considerable local affection.

POLICY 7.14. TO PROTECT AREAS SURROUNDING IDENTIFIED EAGLE NESTS FROM CONFLICTING LAND USES.

Standard Operating Procedures

7.14 - SOP1 Mature trees that, typically, are suitable for eagle nests should be retained within 1/8th of a mile of the coast.

7.14 - SOP2 In situations where lands are proposed for private platting next to CBJ-owned lands, and if the private party is willing, the CBJ government will consider exchanging land of equal value for those lands within 330 feet of the eagle nest tree and retain it as an eagle management area.

7.14 - SOP3 Prohibit the cutting of trees near shoreline areas for the purpose of eradicating nesting eagles or of preventing eagles from nesting therein.

Development Guideline

7.14 - DG1 Private land within the eagle management radius should be left undeveloped or subdivided into large lots, the largest of which should contain the nest tree. Roads should be located as far from the nest as possible, preferably landward from the nest tree. Low density residential or open space/natural areas uses should be located within the eagle management radius.

Implementing Actions

7.14 - IA1 Amend the Land Use Code to include variance criteria that apply specifically to requests to allow development within the buffer area around a bald eagle nest. Developing these criteria is of crucial importance in order to allow responsible development within 330 feet of eagle nests, especially those nests that post-date adjacent development. It may be appropriate to adopt regulations for development near eagle nests based on the level of tolerance of the subject eagles to human activity.

7.14 - IA2 Work with the United States Fish and Wildlife Service (USFWS) on an as-needed basis to identify eagle nest locations and best practices.

7.14 - IA3 Consider designating as Natural Areas or other low impact land use categories areas where eagles tend to nest in concentrations.

7.14 - IA4 Request that the USFWS evaluate the Bald Eagle in the Urban Service Area in terms of population, behavior and tolerance of human presence and activity. Consider any new suggestions from the USFWS for enhancing the presence and health of eagles in the urban area.

7.14 - IA5 Support the efforts of a local non-profit eagle rehabilitation facility to rescue, heal and return to the wild, injured or vulnerable eagles and to educate the public as to the health and well-being of the species.

Bear Protection

A recurring problem that may grow as more of the CBJ becomes developed is the tendency of bears to become food-conditioned to human-generated garbage. Many developed areas of the borough sit astride traditional bear pathways or are adjacent to bear habitat. The clear indication is that once a bear becomes conditioned to eating

garbage, it is likely to continue pursuing human-related food items. Given a food reward, nor become more and more comfortable around homes and people, which often lead to conflicts with people and their property and eventually results in the death of the bear.

Changes to laws regarding garbage storage have resulted in a significant decrease in bear-related complaints to the Juneau Police Department (JPD) and the Alaska Department of Fish and Game (ADF&G). Throughout the borough, refuse containers are now required to be bear resistant unless they are kept indoors (CBJ 36.20.056). In addition, garbage cans may not be put on the curb until after 4:00 AM on the day of pickup, and all dumpsters must have either metal locking lids or be kept in bear resistant enclosures. Arrow Refuse began using roll-carts for residential waste collection in the spring of 2012; these cans are not bear-resistant containers, although many Juneauites have mistaken their locking lids for bear-proof devices. Municipal trash receptacles are bear-proof. All of these changes, with the exception of new cans that are erroneously perceived as being bear-resistant, have resulted in fewer bear/human conflicts simply by making it more difficult for bears to access human food waste.

ADF&G coordinates closely with the JPD regarding bear incidents. The JPD patrol officers inform the JPD Community Service Officers (CSO) about bear problem locations so that CSO's can follow up with closer monitoring of garbage storage at those locations. CSO's issue tickets to property owners who do not comply with laws on garbage storage. This enforcement has made a huge difference in getting the attention of community residents and lessening the number of human/bear conflicts.

In addition, the CBJ government, along with the ADF&G and the United States Forest Service, have teamed up to sponsor the "Alaska Bears in Communities" program that provides bear education to students in grades 1, 3, 5 and 7 in the Juneau School District. This effort enhances the knowledge and appreciation of CBJ residents toward bears and leads to a greater stewardship by residents that begins with proper refuse management.

Bears are enjoyed by the community as a natural resource, and in many cases are sources of pride for Juneau residents. Accordingly, trapping or destroying bears because they are accessing garbage is upsetting to many residents. With abundant bear habitat and numerous bears adjacent to urban areas, the community will see its fair share of bear activity. It is vital, therefore, that the steps taken thus far to limit access to garbage by bears be continued and built upon. The decrease in bear/human conflicts and associated phone calls and reports to the JPD and ADF&G is a testament to the success of the current strategies of managing refuse.

POLICY 7.15. TO PREVENT BEARS FROM GAINING ACCESS TO AND BECOMING CONDITIONED TO THE CONSUMPTION OF HUMAN-GENERATED FOOD AND GARBAGE BY PROVIDING PUBLIC EDUCATION, PROPER MANAGEMENT OF GARBAGE, AND PROTECTION OF THE NATURAL HABITAT AND FOOD SOURCES UPON WHICH BEARS DEPEND.

Standard Operating Procedures

7.15 - SOP1 Continue the current effort coordinated with JPD and CDD to monitor compliance with refuse container ordinances and maintain efficient and effective enforcement.

7.15 - SOP2 Provide public education and publicity to enlist the community's efforts to prevent bears from gaining access to garbage.

Development Guidelines

7.15 - DG1 Place Bear Food Conditioning Avoidance Best Management Practices on permits, as a condition of approval, for development located in or adjacent to bear habitat.

7.15 - DG2 Require construction of bear-proof garbage/refuse/recycling storage facilities in proper locations in all new multi-family residential developments and non-residential developments.

Implementing Action

7.15 - IA1 Study the feasibility of mandatory garbage pick-up in the roaded area of the borough, its costs, and its effectiveness in preventing stockpiled garbage.

Gravel Resources

Gravel resources, essential to construction, are limited to relatively small areas in the borough that are also frequently subject to development pressures. Growth and development in Juneau have increased local demand for sand, gravel and quarry rock. The most extensive deposits of sand and gravel are in the valleys of the Mendenhall, Herbert, and Eagle Rivers, as well as Lemon Creek. Primary sources of sand are the alluvial deposits within the Mendenhall Valley and areas adjacent to the Gastineau Channel. Rock suitable for quarrying is located throughout the CBJ area. The Natural Resource Inventory Sand, Gravel, and Quarry Rock (1978), the West Lemon Creek Material Resource Assessment (1985), and Eleven Potential Borrow Resource Sites Within and Adjacent to the City and Borough of Juneau (1988) are the primary sources of information regarding the location of these resources. Local builders state that the highest quality gravel material in the borough is on land owned by the CBJ government.

Development in areas where potential sand and gravel deposits are located can preclude extraction of these resources, both when they are built upon directly and when residential uses are developed nearby. As growth and development continue in the Mendenhall Valley and Lemon Creek areas, pressure for closing existing pits may grow, primarily because gravel extraction operations produce noise, dust, heavy truck traffic, run-off and other impacts that often conflict with surrounding land uses. As this resource is necessary for all types of development, and given the inherent conflict of this heavy industrial use to less intense neighboring uses, it is important to take steps to avoid or minimize land use conflicts.

POLICY 7.16. TO CONSERVE KNOWN GRAVEL DEPOSITS AND TO PROTECT THEM FROM CONFLICTING LAND USES.

Development Guidelines

7.16 - DG1 Where residential or other developments with sensitive receptors are permitted next to gravel deposits, require that a general note be placed on the affected subdivision plat and on property deeds and other appropriate title papers that advises prospective buyers of the proximity of the gravel resource, the potential noise, dust and truck traffic associated with its extraction and transport, and the expected number of years that the gravel extraction is expected to last. Sensitive receptors are all developments whose occupants can be harmed or annoyed by noise, dust, fumes and heavy truck traffic.

7.16 - DG2 Companies that transport gravel and rock products should be required to travel on roads with adequate heavy load-carrying capacity. Vehicles carrying rock and gravel are required to cover their loads so that the material remains in the vehicle and does not escape to break windshields or harm pedestrians or bicyclists.

Implementing Action

7.16 - IA1 Designate known gravel resource areas on the CBJ GIS and Land Use Code Maps.

7.16 - IA2 Amend the Land Use Code to require additional review of any permanent structures or other development proposed within untapped gravel resource areas that would preclude the eventual development of gravel resources: allow development if evaluation by a licensed civil engineer demonstrates that significant gravel resources do not exist on a particular site and if development does not interfere with extraction of gravel resources in nearby areas.

HAZARDS

All Hazards Mitigation Plan

The City and Borough of Juneau *All-Hazards Mitigation Plan* of 2009, as updated periodically and adopted by Resolution, investigates many more types of hazards than are identified in this Chapter. Risk assessment of each hazards type is provided, with a mitigation plan for each hazard threat. This plan is required to be updated every five years and is managed by the CBJ's Emergency Programs Manager. It is used to prioritize and support requests for funding of mitigation projects by the state and federal governments.

Landslide and Avalanche Hazards

Avalanches and landslides present a very serious threat to human safety and development in some areas of the borough, and their nature and severity have been documented in many, but not all, of the hazard areas. Careful evaluation of specific sites and corresponding land use and engineering solutions can help to minimize the risk of disaster.

Avalanches and landslides are discussed together because of their many similarities. Snow slides, or avalanches, are most likely to occur on moderately steep slopes, and although vegetation can help prevent avalanches from beginning as long as the vegetation is taller than the snow is deep, vegetation will not stop an avalanche from starting when the snow level is deeper than the vegetation is tall. Landslides or mudslides also typically start in moderately steep areas with little to no vegetation, or where previously-disturbed root systems cannot hold the underlying material (earth, rock, etc.) in place.

The debris and rubble at the base of steep rock slopes consists of soil and rocky materials that were deposited by slow erosional processes and/or sudden large-scale movements of dirt and rock, which may fall as earth/rock-only landslides or which may become entrained in avalanches. These debris slopes are indicative of historical landslides and/or avalanches. Studies of existing data and an analysis of aerial photographs indicate general locations and boundaries of landslide/avalanche areas.

The Land Use Code regulates development in landslide/avalanche areas and allows a developer to challenge the boundary of the avalanche and mass wasting area shown on the maps by submittal of a site-specific engineering analysis. If the Engineering Department is satisfied with the analysis, and the required criteria have been considered, the maps are revised.

The *Juneau Area Mass-Wasting & Snow Avalanche Hazard Analysis* was completed in 1992, but has not been adopted by the CBJ. It attempted to update portions of a study completed in 1972, the *Geophysical Hazards Investigation for the City and Borough of Juneau, Alaska and its Technical Supplement*, which provided initial mapping of these hazards. There are still areas needing more detailed study and other areas where landslide and avalanche potential has not been studied at all. The 2011 *Avalanche Mitigation Study: Behrends Avenue avalanche path and White Subdivision avalanche path, Juneau, Alaska*, conducted by WSL Institute for Snow and Avalanche Research SLF, reviewed the Mt. Juneau avalanche paths and made recommendations for mitigating danger in these paths. The 2011 Study also found that the hazard area boundaries in the 1972 Investigation were more accurate than those in the 1992 Analysis. The 2011 Study will be incorporated in the *All-Hazards Mitigation Plan,* which is adopted by Resolution. Documented or not, the threats are real and the consequences can be devastating.

POLICY 7.17. TO MINIMIZE THE THREAT TO HUMAN SAFETY AND DEVELOPMENT POSED BY LANDSLIDES (MASS WASTING) AND AVALANCHES.

Development Guidelines

7.17 - DG1 If a developer disagrees with the boundaries shown on the CBJ-adopted hazard maps, the developer may seek departmental relocation of the boundaries by submitting site-specific studies prepared by a licensed engineer, geologist, or recognized specialist in snow avalanche or mass-wasting behavior, energy, velocity, and destructive potential. Such studies shall include detailed analyses of topography, vegetation, soil and snow conditions, storm and climate analysis, and other factors relevant to the description of the snow avalanche or mass-wasting process. The study must describe how each of the factors was used in re-evaluating the snow avalanche or mass-wasting hazard. The results must indicate hazard boundaries and the physical characteristics of the process (extent, velocity, energy, flow height, impact and depositional loading, etc.).

7.17 - DG2 Review any proposed land disposals of CBJ-owned lands in light of their hazard classification; retain ownership of CBJ lands with moderate- to high- potential for avalanche or mass-wasting (landslide).

7.17 - DG3 Eliminate from long- and short-range development plans any public facilities that would have the effect of concentrating people in hazard areas; do not preclude roads through hazard areas.

7.17 - DG4 Tax-foreclosed property in the high hazard areas should be dedicated to the CBJ publicly-natural areas inventory.

Implementing Actions

7.17 - IA1 Designate areas of moderate and high landslide/avalanche hazards as being subject to such threats on the CBJ GIS database and maps as well as the Land Use Code Maps.

7.17 - IA2 Designate all public lands located in hazard areas as Hazard Areas (HA) on the Comprehensive Plan Maps. Include all CBJ-owned land in hazard areas in the Parks and Open Space/Natural Areas Plan.

7.17 - IA3 Complete the reassessment of hazard areas and include all areas of the original 1972 study, including the downtown Juneau waterfront area. Complete detailed mapping of the White Subdivision, Thunder Mountain and Thane Road hazard areas.

7.17 - IA4 Provide mitigating standards in the Land Use and/or Building Code for development in landslide and avalanche hazard areas based on the 1972 study. These standards may include dissipating structures or dams, appropriate structural and special engineering, or other techniques that respond to the specific hazards of the site. All development in the hazard areas must include mitigating measures that respond to the specific hazards of that site.

7.17 - IA5 The CBJ government should, to the greatest extent practical, acquire properties lying within areas designated as having high mass wasting or avalanche hazard potentials; these CBJ-owned lands should remain undeveloped.

7.17 - IA6 Amend the Land Use Code to prohibit industrial and resource extraction activities in high landslide or avalanche hazard areas unless it is determined that these activities will not increase the threat of landslides and avalanches on nearby lands.

7.17 - IA7 Amend the Land Use Code to require a hazard threat study for proposed development in areas outside of mapped hazard areas if the property shows potential for containing or being affected by such threats.

Earthquakes

The nearest known active seismic fault is the Fairweather, approximately 100 miles west of Juneau. Lynn Canal, Chatham Strait and the Gastineau Channel are classified as having major, though presently inactive, faults. Based on studies by the U.S. Army Corps of Engineers and United States Geological Survey, the CBJ Building Code places Juneau in a Seismic Design Category D1, in which major damage to structures from an earthquake equal to or greater than 6.0 on the Richter scale may occur (previously known as a Seismic Zone 3). There have not been any earthquakes of this magnitude within 125 miles (the range at which damage from such an earthquake might occur) of Juneau since record-keeping began (1847), but the Fairweather fault has seen earthquakes as powerful as 8.6 on the Richter scale, and in a two year-period (1899-1900) there were four earthquakes on this fault between 6.0 and 8.1 on the Richter scale. Since 1972, there have only been two earthquakes with epicenters within 125 miles of Juneau; both were measured as magnitude 4.5 quakes.

Flooding

Flooding occurs with relative frequency in the CBJ. It is a natural event that becomes a problem only when it threatens human health, safety, or development. Appropriate land use designations and development requirements can help minimize the potential of flood damage and threats to human health and safety. It is important to distinguish between the floodway, which is the main channel that is essential to the rapid drainage of floodwaters, and the floodplain, which is an area floodwaters may cover. Additionally, coastal flooding can occur as a result of high winds and high tides that create storm surges and wave run-ups.

Floods occur when climatic factors and development activities alter natural flow conditions in flood prone areas. Warm rainfall on a heavy snow pack or periods of heavy melting contribute to high stream flows and may result in flooding. The most serious flooding (that which threatens human safety and development) occurs when peak stream flows coincide with high tides, or in unique and highly unpredictable situations such as the outburst flood

of a glacier lake. Development, such as roads and buildings, creates impermeable surfaces that increase volumes and rates (velocity) of stormwater runoff. Stream crossings and under-sized culverts that are blocked by stream debris or ice restrict the passage of storm flows and can cause flooding.

Construction in floodways is dangerous to human life and property and further increases flooding potential and is, therefore, prohibited. In the 100-year floodplain, development should be prohibited unless measures that mitigate potential on-site and development-induced upstream and downstream hazards are undertaken.

The current floodplain requirements in the Land Use Code have been developed to comply with the Policy below and with the requirements of the Federal Emergency Management Agency (FEMA) so that local property owners can maintain eligibility under the National Flood Insurance Program. This insurance is available anywhere in the CBJ and is mandatory for any financing of property in Flood Hazard Areas if the loan has federal origins.

POLICY 7.18. TO PROHIBIT RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL DEVELOPMENT IN FLOODWAYS, TO REGULATE DEVELOPMENT IN FLOODPLAINS, AND TO MAINTAIN A PROGRAM OF EDUCATION, ASSISTANCE, AND INFORMATION IN ORDER TO MAINTAIN ELIGIBILITY FOR THE NATIONAL FLOOD INSURANCE PROGRAM FOR THE BENEFIT OF LOCAL PROPERTY OWNERS AND THE LENDING INDUSTRY.

Standard Operating Procedure

7.18 - SOP1 Use the floodway and floodplain boundary lines outlined on maps prepared by FEMA as the basis for defining flood boundaries.

Development Guideline

7.18 - DG1 Apply the Flood Hazard Provisions of the Land Use Code to development proposals in the 100-year floodplain that increase flood danger, and prohibit commercial or industrial storage of toxic chemicals or materials in the 100-year floodplain.

Implementing Action

7.18 - IA1 Designate, on the CBJ GIS maps and Land Use Code Maps, areas within the 100-year floodplain but outside floodways as public open space/natural areas or stream corridor protection areas if the subject land is in public ownership.

POLICY 7.19. TO WORK TO PROTECT THE INTERESTS OF THE COMMUNITY BY TAKING AN ACTIVE ROLE IN DEVELOPING MAPPING AND POLICY CHANGES AT THE STATE AND FEDERAL LEVEL.

Standard Operating Procedures

7.19 – SOP1 Actively participate in review and comment opportunities for proposed changes to state or federal mapping or policy changes.

7.19 – SOP2 Be proactive in suggesting changes to state or federal maps and policies that will protect community interests.

CHAPTER 8
TRANSPORTATION

A safe, efficient, convenient and interconnected transportation system facilitates the movement of people and goods to and within the borough while conserving land resources and energy as well as reducing air pollution. Timely and coordinated multi-modal transportation improvements are necessary to improve the livability of existing and emerging neighborhoods. This is particularly true for the provision of public rapid transit to serve affordable housing units within the Urban Service Area and for workers commuting to downtown Juneau. Working in conjunction with the State of Alaska Department of Transportation & Public Facilities (ADOT&PF), the CBJ government completed an *Area Wide Transportation Plan* (AWTP) in 2001. The AWTP's top six priority transportation system improvements are paraphrased below for reference.

1. Establish and implement Transportation Demand Management Policies throughout the borough focusing on reducing single-occupant-vehicle (SOV) trips and promoting alternative modes of travel such as transit, carpooling, car-sharing, bicycling and walking. These policies should also focus on encouraging telecommuting, flexible work schedules, and be presented as regulations, conditions of approval of use permits, and as incentives;

2. Increase frequency of transit service throughout the urban and suburban areas with express bus service provided from Auke Bay to downtown Juneau with a link to downtown Douglas;

3. Develop Local Street Connections/Access Management. The AWTP seeks to develop local street connections between subdivisions and adjacent local or collector streets to maximize connectivity and minimize local vehicle trips on principal roadways. Where feasible, connect streets for pedestrian, bicycle and vehicle use. Improve connections from neighborhoods to a regional (interconnected Borough-wide) non-motorized trail system;

4. Establish and maintain bicycle lanes, pathways, sidewalks and bus stops where they are needed. Maintain bicycle lanes, pathways, sidewalks and bus stops with regular re-striping, re-surfacing, street sweeping and snow removal;

5. Safe (referred to in the AWTP as "Enhanced") Routes to School Program. Under SAFET-LU, the Alaska Department of Transportation & Public Facilities (ADOT&PF) funded safe routes to school programs. This program was essentially eliminated under MAP-21. ADOT&PF recommends sidewalks on one or both sides of a street, as appropriate, in all medium-to-high- density commercial or residential subdivisions. Throughout the urban and suburban areas of the borough, school buses should be provided pull out areas along their routes where operators can pull out of the travel way to allow other vehicles to pass; this will significantly reduce travel times for many peak hour motorists.

6. Seek federal funds for local transportation needs such as trails, pedestrian safety facilities, bike lanes, scenic enhancements and local transit improvements as well as roads and other vehicle transport-and parking-related improvements; all of these elements should comprise a coordinated transportation system and program. Federal funding of local improvements must be identified in the ADOT&PF Needs List in order to be included in the Statewide Transportation Improvement Program (STIP); the STIP identifies local improvements also funded and implemented by the ADOT&PF.

Many of the Implementing Actions described below must be included as improvements in the next t STIP before they can be considered for funding. Oftentimes, a single needed roadway improvement waits ten to twelve years before it is funded, designed and constructed. This waiting period encompasses the entire 20-year planning horizon of this *Plan* Update. As such, the approach this *Plan* takes in identifying more intense use of transportation facilities, and adjacent land uses, is a conservative approach that seeks to minimize impacts on existing transportation systems and facilities that would result in a noticeably lower level of service, lower standard of living, and reduced livability of neighborhoods and communities. In other words, the *Plan* focuses new development on vacant lands located along public transit routes instead of on vacant lands located within neighborhoods that already have congested roadway intersections.

Although the CBJ *Comprehensive Plan* has placed an emphasis on transit-oriented development, with denser, mixed-use areas near transit routes and major stops in order to promote the efficient use of limited public resources, this emphasis does come at a cost. Investments in infrastructure such as new roads, sewer, and water utilities can be avoided by promoting infill development, but adequate transit service must be provided in order to realize the benefits of denser development. Without high levels of transit service, including features such as 30 minutes maximum between buses during the service day and extended service hours (currently, only four buses travel from the Mendenhall Valley to downtown Juneau early enough to arrive before 8:00 AM, and two of these are Express routes with limited stops), transit cannot be considered a viable transportation alternative by most choice riders. And without high levels of ridership, regulatory changes such as lower parking requirements cannot be justified for new developments near transit routes. Accordingly, investment in the transit system, and its expansion in terms of service frequency, service day duration, and geographic scope will be required in order to realize the intended savings in other infrastructure.

Maintenance and snow removal of transportation infrastructure is of critical importance, as roadways, sidewalks, separated paths, and bus stops must all be kept in good repair and be cleared of snow and ice to function. Snow removal and storage must be considered and accommodated in the design of roadway sections and other transportation infrastructure, and adequate resources must be made available to ensure that infrastructure can be used safely.

Other Relevant Adopted Plans

Many of the transportation problems discussed in this chapter are analyzed and recommendations are proposed in the following relevant documents that have been adopted by the CBJ Assembly and which should be reviewed, along with any other adopted updates, when considering capital improvements and/or permit applications:

- CBJ *Area Wide Transportation Plan*, Volume 1, Transportation Plan Recommendations, July 2001;
- CBJ *Capital Transit Development Plan*, 2008;
- Juneau *Non-Motorized Transportation Plan*, November 2009;
- The *Juneau Trails Plan*, January 1993, Parks and Recreation Department in cooperation with the Alaska State Parks Department and the U.S. Forest Service;
- *Downtown Juneau Parking Management Plan*, 2010;
- The *Long Range Waterfront Plan* for the City and Borough of Juneau, November 2004;
- The *Willoughby District Land Use Plan*, 2012; and
- New and updated plans adopted by the Assembly should also be reviewed.

The CBJ is Alaska's Capital City

Alaskans visiting their elected representatives and state and federal government agencies primarily use air transportation to reach Juneau. The activities at the airport are as varied as the commerce, needs, and people who live in or visit Juneau, and the air transportation utilizing the airport is critical for the movement of both goods and people into and out of Juneau.

Juneau International Airport (JNU)

Juneau's airport has played an important role in the past development of the community and will play an even greater role in the future. The airport is essential to many of the policies and implementing actions of the *Comprehensive Plan*, such as State Capital, tourism and visitors, commercial and industrial development, mining, seafood industry and commercial fishing, regional economics and services, wetlands, noise, trails and regional transportation system. Juneau's transportation and commerce links are limited to marine and aviation access. This necessarily places a higher value and greater responsibility on the airport's operation and development than is found in many communities.

The airport has been doing extensive safety upgrades. The runway has been expanded, security fencing installed, and improvements were made to the float plane pond to reduce bird habitat. Due to the environmental impacts that these upgrades had, mitigation funds were put in place to acquire conservation areas around the Mendenhall Wetland Game Refuge. The Southeast Alaska Land (SEAL) Trust has been working with neighboring property owners and many acres have been put in conservation status.

The CBJ government must continue responsible development of the airport to meet the expanding needs of Juneau residents and to provide access for Alaskans to their legislature and state government. Responsible development will contribute to the economic growth and diversification of the community. Nonetheless, such development must take into account the importance of Juneau's wetlands to fish and wildlife. Development must minimize impacts of airport development on the wetlands.

Alaska Airlines provides the sole commercial jet service to JNU, with direct links to Southeast communities and to Anchorage and Seattle. The advent of Required Navigational Performance (RNP) approaches utilizing airborne equipment, coupled with specific ground-based meteorological equipment has resulted in a significant reduction in poor-weather flight cancellations. This increased dependability has improved the utilization of the airport by reducing delays and allowing operations that otherwise would not occur.

The airport regularly supports multiple medivac services; National Guard, search and rescue s; aircraft operated by the US Fish and Wildlife Service, US Forest Service, Alaska State Troopers, Alaska Department of Public Safety, and Civil Air Patrol mission aircraft. US Coast Guard helicopters routinely utilize JNU in support of their missions, and aircraft of other branches of the military also use JNU occasionally.

The nation's third largest helicopter flightseeing fleet operates in Juneau. The projected growth in tourism will result in an ever busier airport. A strong General Aviation fleet operates from JNU. An unmet need for general aviation hangar space continues to be a challenge at the airport. Major expansions to leasable area are underway as the 2013 update to this *Plan* is underway; additional general aviation hangar space, as well as the consolidation of field maintenance and snow removal facilities into a new structure, will help meet this need.

The airport serves as a hub for northern Southeast Alaska. Residents of Haines, Skagway, Gustavus (and Glacier Bay National Park), Hoonah, Angoon, Tenakee, Kake, Elfin Cove, and Pelican are served by air taxi operators using JNU. Connections to the Lower 48, as well as the rest of Alaska, are made in the CBJ. The development of Juneau as a regional center for commerce and medical service emphasizes this aspect of the airport's role. The FAA classifies Juneau International Airport as a small hub airport, based on passenger enplanements in the *National Plan of Integrated Airport Systems.* Passenger enplanement in Juneau hovers between the second and third highest in the state.

The airport operates within the regulatory purview of the Federal Aviation Administration (FAA), which issues the Airport Operating Certificate, and the Transportation Security Administration (TSA). Many other agencies have regulatory, enforcement, or advisory roles related to operations at the airport. These include the US Fish and Wildlife Service, the US Forest Service, the US Department of Agriculture, Alaska Department of Fish and Game, the US Army Corps of Engineers, US Environmental Protection Agency, the National Transportation Safety Board, the Alaska Department of Environmental Conservation, the Alaska Department of Transportation and Public Facilities and, of course, the US Department of Homeland Security.

In the time since its original siting, development has grown toward and around the airport, making aviation-related land use decisions extremely difficult. There is an inherent conflict between airports and adjacent residential u

Typically, land surrounding an airport is placed in an industrial use designation, which is more compati the impacts of aircraft and the shipping functions of the airport; industrial tenants are more tolerant of noise, dust, fumes and traffic associated with airports than are residential neighbors. With the very limited number of buildable sites for residential and commercial uses in the borough, those uses have encroached into the industrial buffer zone surrounding the airport, making vacant land for aviation-related businesses more expensive and hard to find.

POLICY 8.1. TO PROMOTE AND SUPPORT AVIATION SAFETY; TO DEVELOP AND MAINTAIN AIRPORT FACILITIES MEETING THE AVIATION TRANSPORTATION NEEDS FOR JUNEAU, ITS RESIDENTS, VISITORS AND COMMERCE; AND TO WORK WITH THE PUBLIC AND PRIVATE SECTORS TO FACILITATE COMMERCE, ECONOMIC DEVELOPMENT, AND ACCESS TO ALASKA'S CAPITAL CITY.

Standard Operating Procedures

8.1 - SOP1 Recognize that the proximity of the airport to wetlands and forested lands create an inherent conflict between fish and wildlife habitat and airport operation, development and aviation safety. In reviewing airport development proposals and permit applications, acknowledge that aviation safety is paramount and should not be compromised.

8.1 - SOP2 Protect all designated airport properties from land use conflict and/or displacement.

8.1 - SOP3 Keep the Airport Master Plan current.

8.1 - SOP4 Encourage the continued refinement and application of Global Positioning System (GPS) technologies, such as RNP and CAPSTONE technologies, to allow increased rough-weather landings at the Juneau International Airport and to improve aviation safety for both commercial and general aviation.

8.1 – SOP5 Notify and work with the Airport Manager and the FAA to ensure that new development does not negatively affect airport operations; in particular, development that is 200' tall or that intrudes into the 7460 Contours or the FAR 77 Surfaces in place for the airport at that time requires FAA and Airport Manager notification.

Implementing Actions

8.1 - IA1 Continue to fund and complete the expansion plans and mitigation measures recommended in the *Airport Expansion Final Environmental Impact Statement* (FEIS).

8.1 - IA2 Improve motor vehicle and pedestrian access and circulation to and through the Juneau International Airport including ingress, egress, parking, and non-airport traffic flow.

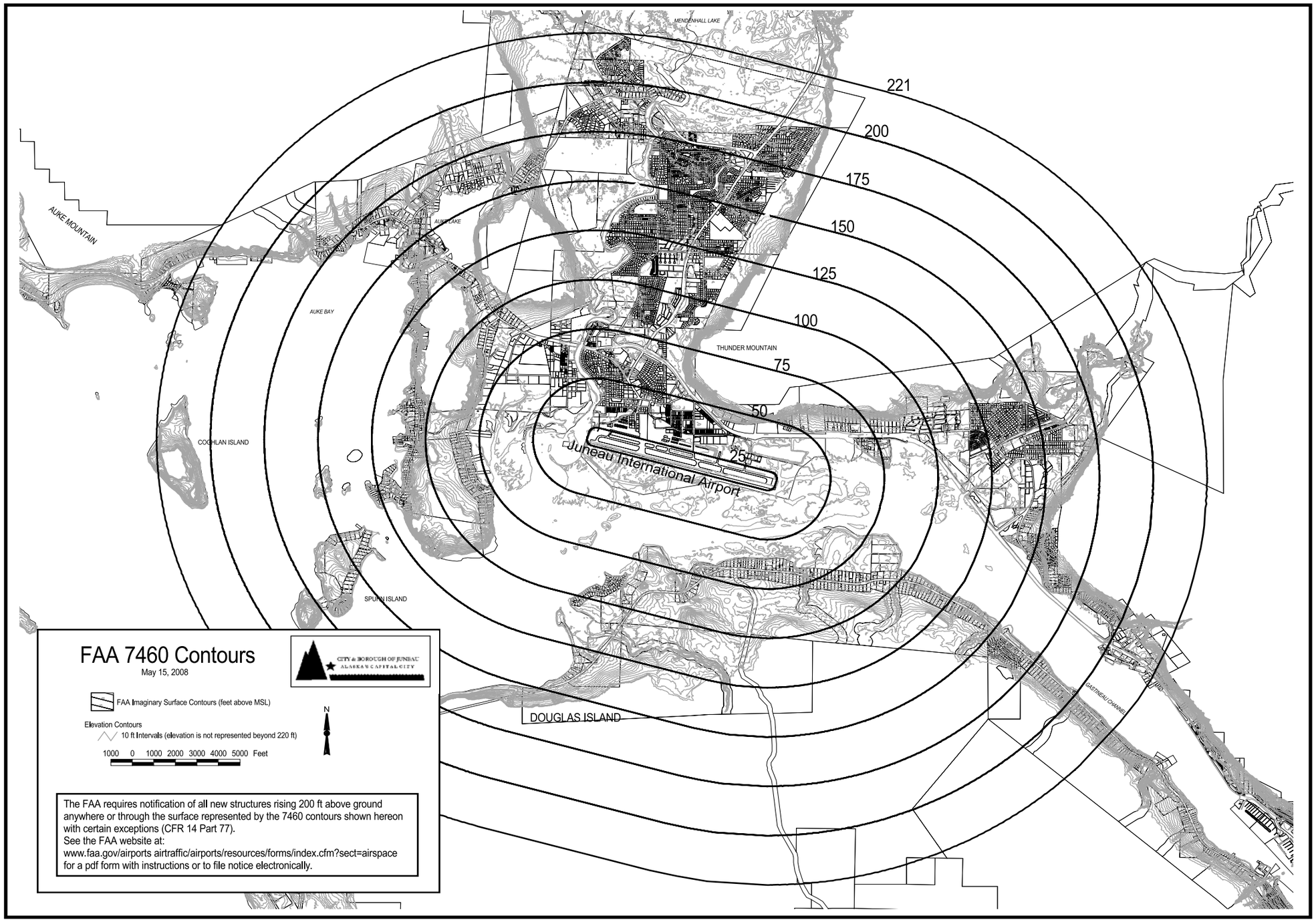
8.1 - IA3 Consider establishing a new Noise Notification Overlay District that encompasses lands near enough to be affected by uses known to generate nuisance noise, such as: gravel extraction areas, landfill sites, outdoor shooting ranges, airports and heliports. Within this overlay district, property owners should be required to notify prospective tenants and/or purchasers of the presence of these land uses and their potential noise impacts. Also consider amending Title 19, the Building Code, to require adequate noise mitigation in building design and construction within this overlay district.

POLICY 8.2. TO PROMOTE BUSINESS PRACTICES THAT WILL ENCOURAGE OPEN COMPETITION BETWEEN COMMERCIAL AIR CARRIERS.

8.2 – IA1 Maintain, and upgrade as feasible, the airport terminal to showcase the CBJ as the Capital City of Alaska while promoting the continued viable operation of large and small carriers in the airport.

8.2 – IA2 Revise the Land Use Code to provide for the mixture of uses that are usual and customary at the Airport and also address neighborhood issues.

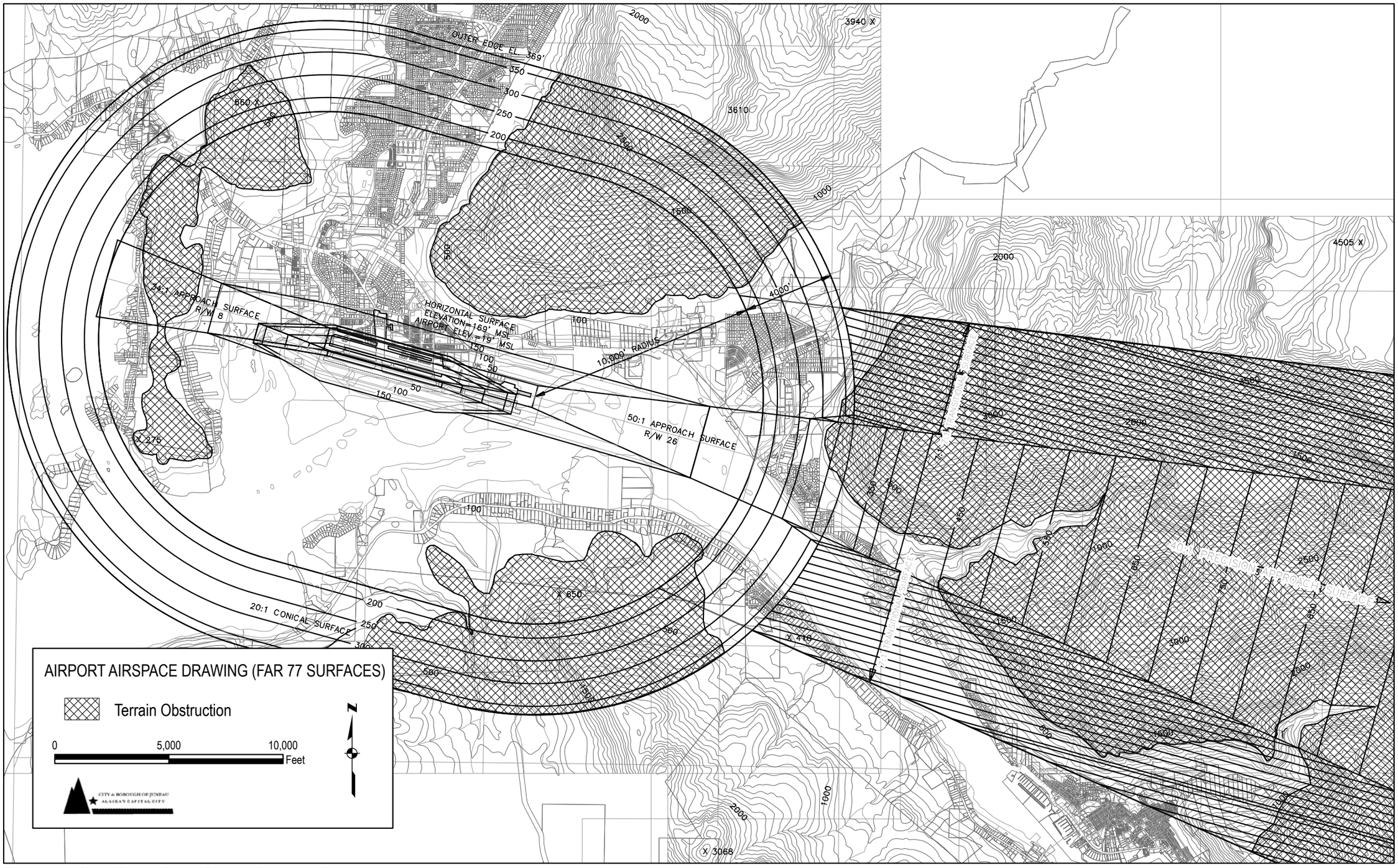
8.2 – IA3 Improve the capacity of the terminal to accommodate additional commercial passenger jet service.



Prepared by: Community Developement Department

Map 8.1

FAA 7460 Contours Map – The contours on this map do not account for the expanded Runway Safety Area; FAA restrictions apply to larger areas at the east and west of the runway.



Prepared by the City and Borough of Juneau Community Developement Department

Map 8.2

Airport Airspace Drawing (FAR 77 Surfaces) – The contours on this map do not account for the expanded Runway Safety Area; FAA restrictions apply to larger areas at the east and west of the runway.

Marine Transportation

Marine transportation is critical to Juneau's economy by supporting passenger and freight transport, the commercial fishing industry, and tourism. Juneau must maintain its regional, national, and international transportation links if it is to prosper despite its physical isolation. As Southeast Alaska's largest city, Juneau can improve its role as a regional transportation and service center by improving its access to this transportation network.

The depth of Gastineau Channel affects the ability for barges and other vessels to dock in convenient, central locations in the borough; further exacerbating the difficulty of transiting Gastineau Channel is the vertical clearance of the Juneau-Douglas Bridge, at 51 feet Mean High Water. One of the two marine drayage (barge) companies serving the community must navigate Gastineau Channel only at high tide periods and, as such, their location in the Salmon Creek area is not convenient much of the time. Similarly, the only other barge landing, located on the Rock Dump south of downtown, requires that heavy truck traffic pass through heavily congested pedestrian areas in downtown Juneau during the summer tourism months. The western side of Douglas Island has been identified as a possible location for new marine freight facilities, but this is feasible only if a north Douglas channel crossing and roadways capable of carrying greater volumes of traffic, including heavy industrial-related trucks, are provided from West Douglas to the mainland.

Cruise ship moorages also require improvement and expansion although they, too, are limited by the depth of water in Gastineau Channel. New improvements to small boat marinas and boat ramps, including Amalga Harbor and the government float at Auke Bay, have greatly improved the capacity of these facilities. Additional parking at Auke Bay and continued boat ramp improvements are needed; construction of these improvements will begin in 2013.

The CBJ Docks and Harbors Board was formed by the assembly to oversee port development projects. Emphasis has been, and should continue to be, placed on improving facilities to serve the commercial fishing fleet and promote local fish processing as well as providing facilities and services to recreational mariners and for eco-tourism.

State and federal transportation agencies are responsible for providing surface links between Juneau and other communities of the Alaskan panhandle, or Canada, that have road access.

POLICY 8.3. TO PROMOTE AND FACILITATE MARINE TRANSPORT SYSTEMS AND TO PROVIDE FACILITIES TO TRANSPORT CARGO, VEHICLES, AND PASSENGER TRANSPORTATION, COMMERCIAL FISHING INDUSTRIES, AND RECREATIONAL WATER TRAVEL.

Development Guideline

8.3 – DG1 When reviewing development permits for shoreline areas, intertidal areas or areas seaward of mean high tide, ensure that such development does not adversely affect marine transportation.

Implementing Action

8.3 – IA1 Consider community needs and priorities prior to pursuing funding for projects.

8.3 – IA2 Promote continued study and planning of West Douglas as a deep water port to meet Juneau's marine transportation needs.

REGIONAL TRANSPORTATION SYSTEM

Due to the lack of a road connection with other regions of Alaska and Canada, the residents, visitors, businesses, and even CBJ government depend upon air and marine transportation that also serve the Southeast Alaska region. Waterway transport accounts for much of the passenger, most of the freight, and all of the vehicular traffic to and from Juneau. The Alaska Marine Highway System provides critical access between Southeast Alaska communities, but the ferry terminal at Auke Bay is difficult to reach without a private automobile, and access to this important facility needs to be improved.

POLICY 8.4. TO SUPPORT THE IMPROVEMENT OF TRANSPORTATION FACILITIES AND SYSTEMS THAT REINFORCE JUNEAU'S ROLE AS THE CAPITAL CITY OF ALASKA AND A REGIONAL TRANSPORTATION AND SERVICE CENTER.

Standard Operating Procedure

8.4 - SOP1 Assume a leadership role in the encouragement of transportation links into and out of Juneau. Consider all affordable energy-efficient transport alternatives to improve transportation links between the borough and other areas of Southeast Alaska, including improved air passenger and cargo service, roadways, ferries, and fixed-guideway systems.

8.4 - SOP2 Support development of a Lynn Canal Highway, as this facility is important to provide improved transportation to the Capital City for Alaska's citizens, Alaska's legislators, and for the economic well being of Juneau and the Southeast Region.

8.4 - SOP3 Support the continued operation and improvement of the Alaska Marine Highway System as an important element of access to and from Juneau and the rest of coastal Alaska that helps ensure access to the Capital City and coastal communities.

Implementing Actions

8.4 - IA1 Identify one CBJ agency or staff member that or who can maintain very close communication and coordination with all federal, state and local agencies and private transportation operators in Juneau to ensure that local transportation resources are managed in the most efficient and convenient manner possible.

8.4 - IA2 Improve transportation facilities that accommodate air and marine links between Juneau and outlying communities.

8.4 - IA3 Encourage early and meaningful public participation in transportation decision-making processes.

8.4 - IA4 When analyzing transportation facility options, consider the life-cycle costs of operation and maintenance on the prospective systems, traveler safety, traveler convenience, the growth-inducing impacts of the project on the community and the affected neighborhoods along the route(s), and the environmental impacts of each option on the affected lands and neighbors, including water quality and air quality (noise, fumes, dust), and energy consumption.

8.4 - IA5 Implement the improvements called for in the *Area Wide Transportation Plan* (AWTP) that reinforce Juneau's role as Alaska's capital city and as a regional transportation and service center as funding becomes available. Update and revise the AWTP as necessary.

8.4 – IA6 Work to provide public and private transportation links to the Alaska Marine Highway System ferry terminal in Auke Bay that are coordinated with the ferry schedule.

LOCAL TRANSPORTATION SYSTEM

With the exception of the Mendenhall Valley, existing development in the roaded portion of the borough is essentially linear; that is, development is confined to narrow benches of land on either side of Gastineau Channel and the east side of Lynn Canal. Most development sites are interspersed within and throughout lands that are not buildable due to terrain, forested lands, streams, wetlands or other environmental assets and constraints. This makes provision of transportation facilities comparatively more expensive than in other more compact areas, where arterial roads can serve more homes or businesses per mile of length. Traffic congestion caused by community growth, recreation and tourism-related activities has increased in the Auke Bay, Mendenhall Valley, downtown Juneau area and other corridors in the roaded area. The CBJ government has identified transportation-related problems which include:

1. Key roadway intersections and bridge capacities are overburdened and inadequate to support increased development in the Mendenhall Valley and on Douglas Island. The signalized intersection of Egan Drive and Mendenhall Loop Road experiences the lowest and most congested Level of Service (LOS F) in the peak morning commute period (2003 ADOT&PF data) and 16 non-signalized

intersections experience unacceptable levels of service (LOS D or worse) in the Mendenhall Glacier Highway and Egan Drive Corridors. Traffic congestion at Tenth Street and Egan Drive is at a LOS E and F during the peak morning commute period and Cordova Street and Douglas Highway is at LOS F in the peak morning period. Motorists in areas with LOS D, E, or F experience significant delays in their commute times; those neighborhoods cannot accommodate additional peak hour single-occupancy vehicle traffic related to increased development without noticeable decreased livability and quality of life. In those areas, staggered work hours for downtown workers, roadway and intersection improvements, and transit improvements are needed and should be analyzed, budgeted and included within the ADOT & PF Needs List for subsequent listing in the State Transportation Improvement Program (STIP) as soon as possible to await their turn in the STIP funding cycle;

2. A shortage of buses. Additional Capital Transit bus vehicles are needed and, particularly, the longer "articulated" buses are needed to adequately provide convenient express bus service for commuters traveling to major employment centers. Additional drivers and maintenance staff will also be required as the fleet grows;

3. Incomplete and dangerous pedestrian and bicycle circulation systems, including inadequate sidewalk space in downtown Juneau during the summer visitor season and deficient snow removal and maintenance practices;

4. Street pavement marking materials/technology that is inadequate for the Juneau's climate; and

5. Lack of coordination of transportation plans, facilities and resources among local agencies and private operators.

*See discussion and definition of Level of Service (LOS) in Chapter 3 "Adequate Development Opportunities" and in the Glossary.

Vehicle Transport

It is critical that the community be served by an efficient roadway system that facilitates traffic flow within and between major population centers, including the Valley, Auke Bay, and Douglas Island, as well as to and within downtown Juneau, the community's employment, cultural, and tourist center.

POLICY 8.5. TO PROMOTE A BALANCED, WELL-INTEGRATED LOCAL MULTI-MODAL SURFACE TRANSPORTATION SYSTEM THAT PROVIDES SAFE, CONVENIENT AND ENERGY-EFFICIENT ACCESS AND TRANSPORT FOR PEOPLE AND COMMODITIES.

Standard Operating Procedures

8.5 - SOP1 Provide a safe, convenient, reliable and low-cost public transit and rapid transit system within the Urban Service Area to ensure that within that area, everyone has the ability to access work, school, services, shopping and leisure activities by public transit, with stops located so as to be within ½ mile of each other along routes.

8.5 - SOP2 Maintain area-wide and subarea transportation plans and ensure their consistency with other relevant CBJ-adopted Plans, including the *Comprehensive Plan*, the *Parks and Recreation Comprehensive Plan* and the *Capital Improvement Plan* and Program.

8.5 - SOP3 Provide public transit services to low- and moderate-income neighborhoods and support supplementary transit service for the elderly, handicapped and homeless residents seeking work or medical or social services.

Development Guidelines

8.5 - DG1 Require dedication of all rights-of-way and easements, including those for trails, roads and transit corridors and facilities on subdivision plats and development plans as determined to be appropriate by the Planning Commission for that development. Obtain commitments to construct trails and local and collector roadway improvements from private developers when

projects are approved, and ensure that those improvements are complete prior to issuing building permits on adjacent properties within that development.

8.5 - DG2 Review, implement and maintain appropriate and affordable development standards for major subdivisions and major developments to ensure safe and convenient vehicular traffic and to provide safe pedestrian and bicycle access internal to the subdivision/development as well as to ensure a Level of Service of D or better for roadways and intersections serving the development.

8.5 - DG3 Designate corridors for potential road corridors on the *Comprehensive Plan* Land Use Maps to establish a basis for subsequent site-specific studies, which also address the mitigation of associated environmental impacts through proper location of the actual right-of-way.

8.5 - DG4 Minimize access roadways or driveways onto major and minor arterial roadways or highways by requiring shared access points, such as a frontage road, and connections to adjacent subdivisions' roadways that lead to a "downstream" controlled or grade-separated intersection.

Implementing Actions

8.5 - IA1 Update the list of needed roadway, intersection, bridge and pedestrian/bicycle pathway improvements according to priority, cost, and potential funding, and incorporate it into the CBJ's Capital Improvement Program and the Alaska Department of Transportation & Public Facilities Needs List.

8.5 - IA2 Consider the concept of Bus Rapid Transit (BRT) or other dedicated express bus service throughout the Urban Service Area in future Transit Development Plans and related plans and studies in order to provide faster service between major trip origins and destinations.

8.5 - IA3 Update, adopt and implement the *Capital Transit Development Plan*. Elements of an updated plan may include, but are not limited to the following:

A. Providing all day express bus service to facilitate the movement of people between downtown Juneau and other major destinations in the Urban Service Area;

B. Expanding Capital Transit to provide service on all holidays;

C. Providing additional bus capacity to reduce overcrowding on buses;

D. Providing bus pullout areas at bus stops to avoid impeding the roadway travel lanes with requirements for motorists to immediately allow buses to re-enter the roadway upon their signaling to re-enter;

E. Exploring the feasibility of a Mendenhall Valley shuttle service and/or park and ride linked to downtown by express buses;

F. Exploring the use of buses powered by non-fossil fuels, hybrid technology, or other systems consistent with the community's commitment to sustainability;

G. Providing a downtown circulating shuttle service, serving the Central Business District. Evaluate the feasibility of serving the Federal Building, the Rock Dump, and other popular trip destinations and origins in the downtown area with this shuttle service;

H. Evaluating the best locations and size for Park & Ride facilities and purchase of the land or easements on the land for future improvements. When residential densities warrant, develop the Park & Ride facilities where they can serve commuter traffic from residential areas. These facilities would be in the form of satellite parking areas served directly by transit routes that would provide convenient access and express service to downtown Juneau for residents living significant distances (more than a quarter mile) from existing transit routes. Likely areas that could be served by Park & Ride facilities would be the Mendenhall Valley north of Egan Drive, and areas north or northwest of the University of Alaska Southeast if significant population increases occur in that area; and

I. Providing a mix of transit vehicle sizes powered by non-fossil fuels or hyb promote cost efficiency and to provide flexibility in service.

8.5 - IA4 Identify, map and designate on the CBJ GIS system and in Land Use Maps of the *Comprehensive Plan* a Transit Corridor for which the CBJ government should purchase and/or maintain an adequate easement or right-of-way for travel lanes, park & ride facilities, and transit stops and transfer stations.

8.5 - IA5 Along the identified Transit Corridor for the borough, identify potential transit and transfer stops or nodes and re-zone land around those nodes for high-density residential and/or mixed use and employment centers to facilitate the convenient and efficient use of the transit system. The transit system would, ideally, link the Ferry and Airport transport systems to a "chain" of transit nodes representing major destinations such as shopping centers, transit-oriented residential or mixed use developments, schools and the University, the hospital, major recreation or cultural destinations, major employment centers, and downtown Juneau.

8.5 - IA6 To reduce the demand for land-consuming parking spaces, reduce use of fossil fuels, and encourage the use of public transit, the CBJ government and community should urge downtown federal, state, and local government agencies, as well as private-sector employers to participate in a Coordinated Downtown Transportation Management Program managed by CBJ staff or a third party. The program could include, but would not be limited to, the following features:

A. Free or heavily discounted transit passes to area employees;

B. Improved bus service, including a downtown circulator shuttle;

C. Organized vanpools and carpools;

D. Convenient and free parking for car- and van-pool vehicles, preferential parking for car-sharing, electric, hybrid and other alternate fuel-powered or multiple-user vehicles;

E. Instituting residential parking programs to discourage commuting motorists from long-term on-street parking in residential neighborhoods;

F. Satellite parking within shuttle distance to major destinations in downtown Juneau.

G. Working with the State of Alaska to allow off-hour parking in state employee parking facilities and lots to ease evening and week-end event parking congestion;

H. Increasing parking enforcement, as nearly all of these parking-related actions require enforcement or they will be of minimal utility;

I. Coordinated, perhaps mandatory, staggered or flexible work hours for area employees to avoid peak hour traffic;

J. Provision of safe pedestrian and bicycle routes throughout downtown; and,

K. Provision of secure, dry bicycle storage as well as shower and locker facilities for commuting cyclists.

8.5 - IA7 The CBJ government should investigate the feasibility of providing light or heavy rail public transit service, powered by renewable energy sources, linking existing and new neighborhoods of Douglas Island with the mainland and, in the future, to the Alaskan and Canadian interior. The analysis of the feasibility of such a Borough-wide rail transport system should consider the life-cycle costs of design, construction, environmental mitigation and monitoring, as well as operation, maintenance costs.

8.5 - IA8 Construct or complete the improvements and planning documents called for in the Area Wide Transportation Plan as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding needed to complete those improvements.

8.5 – IA9 Priority for improvements should be given to improve transit corridors, transit Park and facilities, and to roads, bridges and intersections within the Urban Service Area where vacant lands can accommodate higher-density affordable housing if and when such improvements are made to accommodate this development and to improve Levels Of Service to D or better.

Transit First Policy

The CBJ's Capital Transit public transit system provides transport services to about 4,000 riders on a typical weekday. 1.2 million times a year a passenger boards a Capital Transit bus. In May 2001, Capital Transit implemented a 30-minute service (headway) on many of its routes, which resulted in an 18% increase in ridership over the previous year. The system is patronized heavily by government office workers commuting between downtown Juneau and Douglas Island, Lemon Creek and the Mendenhall Valley. The system accommodates approximately 8 to 10 percent of the commuter work force in the downtown area and, with some fleet, route and station improvements, has the potential of displacing a substantial portion of the total vehicular trips made in the borough. A number of recommendations in the 2008 Transit Development Plan, Transit Improvement Plan, Downtown Circulator Shuttle Feasibility Study, and Coordinated Human Services Transportation Plan would improve the convenience and quality of transit service. This would: increase transit ridership; reduce fossil fuel consumption by Single-Occupancy-Vehicles (SOV); reduce SOV-related air pollution; lessen overall congestion and surface wear of CBJ roads, intersections, bridges, and parking facilities; and ultimately reduce commute times for those who still drive SOVs.

Increased numbers of transit vehicles are needed to accommodate commuter ridership to downtown Juneau. Implementation of improved express bus service (over 2008 levels) or other improved transit service along Glacier Highway and Egan Drive should be followed by zoning amendments to accommodate higher residential and employment densities along these transit corridors—the initiation of 30-minute express bus headways in October 2009 warrants consideration of such zoning amendments. Higher residential and non-residential densities along transit corridors will improve the efficiency and reduce the cost-per-passenger of the transit service therein. Typically, 25 to 30 residential units per acre or more would adequately support a Bus Rapid Transit (BRT) or other substantially increased level of transit service.

In 2012, residential density limits and height restrictions were increased in three commercial and mixed use zoning districts in order to allow the higher residential densities called for in this Plan; the community was able to support these changes with minimal discussion, and additional modifications to land use regulations will be necessary in order to realize the goal of increasing residential densities and the diversity and mixture of uses in these areas. As residential and mixed use projects are developed at higher densities along transit routes, transit service will need to grow to keep pace with demand; the strategy of clustering denser development along transit lines may backfire if adequate transit services are not available to meet the induced demand.

As questions of system capacity and funding are raised, which they will inevitably be, it is important to remember that the public's investment in Capital Transit reduces the financial burden of extending water, sewer, road, fire, police, and other services to newly developed areas of the borough. Although the relationship between transit, residential density, housing affordability, and access to jobs is reiterated throughout this Plan, there is another even more direct relationship between funds allocated for projects for different transportation modes (i.e. transit, biking, single-occupant vehicle)

Care-A-Van, the paratransit partner agency to Capital Transit, is currently operated under contract by Catholic Community Services. Other Human Services Transportation Provider agencies, including REACH, Inc., Southeast Alaska Independent Living (SAIL) and the Juneau Alliance for Mental Health, Inc. (JAMHI) work with the Juneau Coordinated Transportation Coalition (JCTC) to ensure that services are coordinated and that projects are prioritized for funding by the various member agencies. As the "silver tsunami" of baby-boomers reaches retirement age (at a rate of 10,000 per day, nationwide), a growing proportion of Juneau's aging population will qualify for, and may require, the services provided by these agencies. Convenient fixed-route service by Capital Transit is far less expensive to provide, per ride, than demand-responsive rides provided by JCTC members and Care-A-Van, so ensuring that fixed route buses are accessible and convenient to these new riders has the potential to avert unsustainable increases in funding requirements for demand-responsive services.

Other transportation options, such as car-pooling and formal car-sharing programs should be investigated for feasibility within the Urban Service Area.

The 2008 *Transit Development Plan, Coordinated Human Services Transportation Plan*, and the r studies in that document make numerous recommendations for improving transit service in the CBJ, including extending the regular and express service day, adding express service to Sundays and Holidays, and serving emerging residential and commercial areas as well as the Alaska Marine Highway ferry terminal at Auke Bay and the Juneau International Airport. Notwithstanding these valuable upgrades of the system, a successful transportation system depending on a public transit system includes a number of private and public-sector sponsored travel options, including:

- Park & ride facilities at transfer station locations;
- "Dial-a ride" para-transit programs (such as the Care-A-Van program);
- Residential parking permit programs in the neighborhoods around downtown Juneau;
- Higher parking rates for day-long parking in the downtown Juneau area;
- Private taxi service;
- Secure storage for bicycles at transit stops and major destinations; and
- Residential densities of 25 units per acre or greater around express bus route stops to support convenient bus service.

The 1996 *Capital Transit Development Plan* offers policy statements that are excerpted below for reference, as they were also the guiding statements in developing the 2008 *Transit Development Plan*:

- Provide an attractive alternative to the private vehicle to reduce their presence in the community and especially in the downtown Juneau area;
- Provide safe, reliable, low-cost transportation to ensure that everyone has the ability to access and participate in community life;
- Implement service in a manner consistent with the promotion of efficient use of urbanized lands;
- Make special efforts to meet the transportation needs of the elderly and persons with disabilities;
- Work to ensure that the need for transportation services at the Juneau International Airport and the Auke Bay Ferry Terminal are met; and
- Explore, and implement when feasible, innovative transportation systems including the potential for future fixed guide-way applications, such as electric-powered trolleys.

Roadways that serve as bus routes have unique needs that can best be determined for a particular area through a context-sensitive, Complete Streets approach to roadway design, but there are some features that make buses better "neighbors," both to other users of the roadway and to adjacent land uses. Some of those features include:

- Adequate lane width, shoulder width, or other separation between the travel lane and adjacent sidewalk;
- Pull-outs for transit vehicles to leave the travel lane while boarding and alighting passengers;
- Safe locations to cross roadways to and from bus stops; and,
- Adequate lane width, lighting, and intersection dimensions for safe operations.

POLICY 8.6. TO PROMOTE AND FACILITATE TRANSPORTATION ALTERNATIVES TO PRIVATE VEHICLES AS A MEANS OF REDUCING TRAFFIC CONGESTION, AIR POLLUTION AND THE CONSUMPTION OF FOSSIL FUELS, AND TO PROVIDE SAFE AND HEALTHY MEANS OF TRANSPORTATION TO ALL PEOPLE.

Development Guidelines

8.6 - DG1 Require sidewalks and bicycle paths or lanes along newly constructed arterial and collector streets where appropriate, and provide or work with ADOT&PF to provide such amenities along existing roads to provide safe and efficient access and recreation and to reduce pedestrian/ automobile conflicts.

8.6 - DG2 Provide sidewalks and bicycle paths in and around the expanded campus of the University of Alaska Southeast, particularly in conjunction with the construction of student housing in the Auke Bay area.

8.6 - DG3 Require sidewalks and bicycle paths along roadways where higher-density housing is to be provided as a condition of a rezoning application for higher densities.

8.6 - DG4 Provide secure, weatherproof bike parking and storage facilities at public buildings and in private developments, particularly developments located along transit corridors.

8.6 - DG5 Require that cul-de-sacs and other dead-end streets be connected to neighboring dead-end streets and through-streets with pedestrian and bicycle paths wherever practical in new developments in order to create non-motorized transportation networks for neighborhood residents.

Implementing Actions

8.6 - IA1 Complete and/or upgrade a continuous separated bicycle/pedestrian pathway between the Mendenhall Valley and downtown Juneau by connecting those portions now existing.

8.6 - IA2 Work with the Alaska Department of Transportation and Public Facilities (ADOT&PF) to construct sidewalks and/or separated paths. If these are not practical, a wide shoulder of at least 48" along roads that lack such improvements, with a priority given to those corridors which have Average Annual Daily Traffic (AADT) of 4000 vehicles or more. According to ADOT&PF 2010 data, these corridors are:

1. Glacier Highway – Vintage Boulevard to Fritz Cove Road – 8,442 to 12,097 AADT
2. Glacier Highway – Auke Bay to Ferry Terminal – 5,480 to 6,724 AADT
3. North Douglas Highway – Juneau-Douglas Bridge to Eagle Creek – 5,508 AADT
4. Thane Road – 5,144 AADT
5. Back Loop Road – Mendenhall Loop Road to Montana Creek Road - 4,788 to 5,274 AADT
6. Although it did not meet the criteria of AADT of 4000 or more vehicles and no sidewalks in 2010, the Lemon Creek portion of Glacier Highway (Lemon Drive) had an AADT of between 11,844 and 12,762 (depending on road segment) and insufficient pedestrian and bicycle facilities; accordingly, this corridor should also be given priority in constructing additional pedestrian and bicycle facilities.

8.6 - IA3 Implement the pedestrian and non-motorized improvements called for in the *Area Wide Transportation Plan* as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding needed to complete those improvements.

8.6 - IA4 Work with the Juneau School District and other agencies to identify opportunities for improved pedestrian and bicycle access to schools.

8.6 – IA5 Design or re-design of transportation corridors should consider the Policies, Dev Guidelines, Standard Operating Procedures, and Implementing Actions of this Chapter so as to ensure that all potential users and all available modes of transportation are considered within the context of the neighborhood and transportation network. Early involvement of stakeholders and residents of the project area are critical to this approach.

8.6 – IA6 Include development of a community-defined local Complete Streets Policy in the next update to the *Non-Motorized Transportation Plan* to formalize what a Complete Streets network includes in Juneau.

8.6 – IA7 Allocate the resources necessary to adequately maintain and remove snow from sidewalks and separated paths.

8.6 – IA8 Prioritize snow removal from sidewalks and separated paths so as to provide safe walking routes for school children, where high numbers of pedestrians are present, or where no alternative routes are available.

8.6 – IA9 Identify discontinuous sections of bicycle lanes and prioritize improvements to connect them.

Non-Motorized Means of Transportation

Improved pedestrian and bicycle movement within and between major shopping and employment centers, schools and other concentrations of population are needed. Pedestrian and bicycle facilities are needed to provide safer and more efficient movement within and between neighborhoods and major concentrations of population. These facilities are also important as an aspect of recreation and can contribute to community health by facilitating active transportation and recreation.

Despite its contribution to congestion, air pollution, expense, accidents and inefficient use of energy, the private automobile remains the favored mode of transportation by the majority of Juneau residents. In a recent traffic capacity analyses by ADOT&PF, nine of the intersections serving the Mendenhall Valley and seven intersections providing access on Douglas Island are overcrowded and are operating beyond their design capacity, and were at Levels of Service (LOS) D, E, and F, where LOS D or better (A, B, or C) is considered adequate capacity. Due to these existing congested intersection conditions, new residential development within those neighborhoods is either prohibited by current zoning standards or is limited to very small in-fill development such as bungalow homes on small, scattered lots.

To accommodate new development, particularly that of affordable housing, the CBJ government and community should encourage and support the provision of alternative transportation opportunities. The most significant impact results from increasing the patronage of public bus service, augmented by commuter carpools and vanpools. Bicycling is an alternative for shorter commuter and shopping trips as well as recreation many months of the year and should be encouraged within and between all major concentrations of population and development. Bicycling and walking are both essentially free transportation modes, and as active transportation modes, they improve public health. Additionally, non-motorized transportation infrastructure construction projects create more jobs than road-only projects do, so their benefit accrues to both the community's transportation network but also public health and economic well-being. The 2009 *Non-Motorized Transportation Plan*, adopted as an addendum to this *Comprehensive Plan*, addresses bicycling and walking with particularity. Maintaining sidewalks and bike paths does require additional resources, especially for snow removal; the budget for adequately maintaining these facilities will need to be provided in order to ensure that they are usable throughout the year

Other sections of the *Comprehensive Plan* address transportation facilities and issues more specifically; these are found in Chapters 10 (Land Use) and 11 (Land Use Maps). Policy 8.6 is also of particular relevance to non-motorized transportation.

Use Renewable Energy for Transportation

The CBJ does not have a current assessment of CBJ government and resident use of fossil fuels, but the community is dependent on the use of fossil fuels to power vehicles, vessels, and aircraft and to heat our homes and businesses among other things. The scarcity of fossil fuels, particularly oil and natural gas, will cause the price of these

renewable resources to rise over time. Powering transport facilities by fossil fuels may not be affordable short-term or sustainable in the long-term. The linear topology of the built-up portion of the borough is amenable to an efficient, high-quality public transportation system. It is prudent to reduce our dependence upon the private vehicle for transportation and to ensure that public transit offers a safe, convenient, and affordable means of travel.

POLICY 8.7. TO ENCOURAGE THE TRANSPORTATION OF JUNEAU RESIDENTS, VISITORS, FREIGHT AND MAIL BY RENEWABLE ENERGY SOURCES ON BOTH PRIVATE AND PUBLIC TRANSPORTATION.

Standard Operating Procedure

8.7 - SOP1 Promote the use of public transportation and car pooling to reduce the reliance of Juneau residents and visitors on single-occupant vehicles.

Implementing Actions

8.7 - IA1 Use a mix of vehicle sizes and fuels for CBJ-provided public transport to promote fuel and cost efficiency, and to keep frequency of service such that it will encourage use of public transportation systems.

8.7 - IA2 Seek to convert fossil-fueled CBJ buses to renewable energy-fueled or hybrid vehicles. Hybrid or other dual-fuel buses that can run on fuel other than electricity are preferable to electric-only buses, especially in light of the effect of the 2008 and 2009 Snettisham avalanches and their effect on the provision of electricity to Juneau.

8.7 - IA3 Encourage conversion of private fossil-fueled buses to renewable energy.

8.7 - IA4 Provide metered electric energy sources at public parking lots and garages to re-charge public and private electric automobiles, and provide preferential parking spaces for those vehicles. The metered electrical sources should have the functionality of being turned off automatically or manually by AEL&P and/or CBJ staff during periods of peak loading of the electrical system or emergency situations.

8.7 - IA4 Retain adequate rights-of-way for fixed-guideway transit systems pending investigation of the feasibility of providing light or heavy rail public transit service, fueled by renewable energy sources, linking existing and new neighborhoods of Douglas Island with the mainland, the Mendenhall Valley with downtown Juneau and, in the future, connecting the Juneau area to the Alaskan interior. In the analysis of the feasibility of such a borough-wide rail transport system, consider the life-cycle costs of design, construction, environmental mitigation and monitoring, as well as operation and maintenance costs.

Subarea Transportation Needs

To ensure a smoothly functioning transportation system, the CBJ government and ADOT&PF must address some serious transportation problems within and between major concentrations of population. The areas most affected by past and projected growth and, therefore, most affected by congestion, include downtown Juneau, Lemon/ Switzer/Salmon Creeks, Mendenhall Valley, Auke Bay, and Douglas Island.

POLICY 8.8. TO RESPOND TO THE SPECIAL TRANSPORTATION NEEDS OF EACH SUBAREA OF THE CBJ AND TO INTEGRATE THEM INTO A BOROUGH-WIDE COMPREHENSIVE TRANSPORTATION PLAN. THIS SYSTEM SHOULD SEEK TO REDUCE THE CONSUMPTION OF FOSSIL FUELS BY FACILITATING EFFICIENT ROUTES OF TRAVEL, CONVENIENT AND RAPID TRANSIT, AND SAFE MOTORIZED- AND NON-MOTORIZED TRAVELWAYS.

Implementing Actions

8.8 - IA1 The CBJ government should continuously establish transportation improvement priorities that can be included in the next revision to the ADOT&PF Needs List and the CBJ Capital Improvement Program. Priority should be given to projects that will help reduce the cost of living in Juneau, especially for low- and middle-income residents.

8.8 – IA2 Develop a coordinated planning process between the city and state regarding tra plans.

Downtown

As documented in the CBJ *Area Wide Transportation Plan* (AWTP), there are several major transportation problems in downtown Juneau. As a major destination for many Juneau residents and for approximately one million cruise ship visitors each year, the resolution of those problems will enable downtown to evolve into a convenient, attractive and dynamic year-round destination for residents and visitors alike. Coordinated planning is needed to improve pedestrian and traffic circulation, accommodate shared use of additional off-street parking, increase rapid public transit service, and facilitate pedestrian movement on sidewalks and crosswalks.

Implementing Actions

8.8 - IA3 Update and revise the priority table of the CBJ *Area Wide Transportation Plan*. Potential priorities for federal, state, and local funding and implementation may include the following:

A. In order to accommodate safe transit, private vehicle, bicycle and pedestrian traffic traveling to and from Douglas Island, urge ADOT&PF to immediately improve the traffic capacity and efficiency at the intersection of Tenth St. and Egan Dr. Any improvements to this intersection or the Juneau-Douglas Bridge should provide adequate safe space for motor vehicles (including industrial trucks and buses), pedestrians and bicyclists.

B. The CBJ should seek funding to design, develop and operate a Downtown Transportation Management Program. [see also 8.5 - IA6 and subarea 6 Guideline and Consideration 13]

C. Encourage ADOT&PF to construct one or more additional travel routes across Egan Drive for pedestrian travel to and from Aurora and Harris Harbors.

D. Pursue the construction of a CBJ street parallel to Egan Drive that connects Aurora Harbor with the University of Alaska Southeast Marine Technology Center and Harris Harbor.

8.8 - IA4 The CBJ government, working in conjunction with ADOT&PF, should develop and manage an emergency transportation plan to address temporary or emergency access between all urbanized portions of the borough and emergency facilities, especially Bartlett Regional Hospital and the Juneau International Airport. Duplicate transportation routes and/or modes should be developed wherever access is currently limited to a single transportation route, such as the Juneau-Douglas Bridge, Egan Drive at Channel and Channel View Drives, and Egan Drive at Yandukin Drive and Glacier Highway.

8.8 - IA5 Implement the subarea improvements for downtown called for in the *Area Wide Transportation Plan* as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding needed to complete those improvements.

Lemon Creek, Switzer Creek, and Salmon Creek

The Lemon Creek, Switzer Creek, and Salmon Creek areas are home to numerous children and adults who regularly use public transit facilities, yet who must use an incomplete sidewalk system to reach bus stops or neighborhood destinations. A safe, separated pedestrian and bicycle circulation system throughout the area is needed for the area, along with weather-sheltered bus stops.

The Lemon Creek area is also traversed by heavy trucks carrying gravel and other heavy loads. A roadway suitable for heavy truck loads traveling to and from the industrial areas, particularly the gravel extraction area, and by-passing residential areas is needed.

When the land above Dzantik'i Heeni Middle School is developed for residential use, as envisioned by this *Plan*, a new roadway to access this area will also be needed. This road should not tie into the industrial by-pass road discussed above; instead, the residential access road should be designed for larger numbers of pedestrians and bicyclists and lower traffic speeds than the industrial road.

Both the industrial by-pass road on the eastern side of Lemon Creek and the residential access road on the side of Lemon Creek are shown on the Subarea 5 Land Use Maps; it should be noted that the alignments shown on these maps are for informational and planning purposes only, and potential alignments will need to be evaluated based on engineering, habitat, cost, and other factors before a route is selected and a road constructed.

Davis Avenue and its intersection with Glacier Highway pose particular problems for pedestrian safety, as well as negatively impacting Capital Transit's on-time performance for southbound buses. This corridor and intersection should be carefully evaluated and re-designed so as to improve safety and to facilitate turning movements; Capital Transit bus routes in this area may need to be redesigned as part of this effort, and service to some areas may need to be reduced so as to improve safety at problematic intersections. A new vehicular bridge over Lemon Creek could allow transit to serve the area more efficiently.

As this 2013 Update to the *Plan* is being adopted, DOT&PF has begun scoping on a project to redesign and reconstruct Glacier Highway through the Lemon Creek area. This project intends to improve pedestrian, bicycle, transit, private vehicle, and heavy truck traffic safety in the corridor by considering the differing needs of each travel mode or vehicle type in each of several segments of the corridor in a context-sensitve manner to building a Complete Street network.

Implementing Actions

8.8 - IA7 Develop and implement a neighborhood transportation facilities improvement plan, in coordination with an area-wide neighborhood plan, for roadway access, sidewalks, pedestrian crossings, bus pullouts and shelters, intersection control and new intersections for Lemon Creek. Consider limiting new access directly onto Glacier Highway to preserve traffic operations in the roadway. In the vicinity of Dzantik'i Heeni Middle School, integrate future traffic control or new intersections with pedestrian needs. This plan and improvement program should include, at a minimum, the following transportation elements:

A. Develop a complete sidewalk system and separated pedestrian/bicycle path throughout the Lemon/Switzer Creek neighborhood, connecting residential land uses to schools, playgrounds, employment centers, retailers, and transit facilities;

B. Construct an industrial vehicle bypass route located away from residential neighborhoods and providing access for heavy vehicles, connecting the industrial area around the Lemon Creek gravel pits to Egan Drive via Glacier Highway;

C. Develop a secondary roadway connection between downtown Juneau and Bartlett Regional Hospital. The connection would be two lanes with separated pedestrian and bicycle facilities. The road should function as a through-road and as a secondary access to the Hospital;

D. Improvements to intersections in order to assure a Level of Service of D or better throughout the Plan study area;

E. Crosswalks across Glacier Highway in mid-block or unsignalized locations should utilize medians for mid-crossing pedestrian refuges; the existing center turn lane should be eliminated except where it is needed for vehicles to queue for left turns off of Glacier Highway at major intersections. Medians should be used to reduce the number of locations where left turns onto Glacier Highway are possible. Snow removal and storage need to be considered in redesigning the roadway; and,

F. Pedestrian-scale illumination, "bulb-outs" at intersections, medians, and other design treatments which provide visual cues to drivers regarding crossing locations and which lead drivers to adjust their speed accordingly.

8.8 - IA8 Implement the subarea improvements for the Lemon Creek, Switzer Creek, and Salmon Creek areas called for in the *Area Wide Transportation Plan* as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding

needed to complete those improvements.

8.8 - IA9 Require sidewalks and bicycle paths or lanes along newly constructed arterial and collector streets where appropriate, and provide or work with ADOT&PF to provide such amenities along existing roads to provide safe and efficient access and recreation and to reduce pedestrian/ automobile conflicts.

The Mendenhall Valley

For the past three decades, the Mendenhall Valley has been the most rapidly growing suburban area in the CBJ. Many of the un-signalized intersections serving this area are now heavily congested, reflecting Levels of Service (LOS) D, E and F that indicate noticeable (LOS D) to irritating (LOS E) to unacceptable (LOS F) delays for motorists seeking to enter those intersections. This congestion affects both public transit and the single-occupancy-vehicle (SOV). Until these traffic conditions are improved to LOS C or better, further development on parcels served by these intersections should be limited to small, in-fill homes or developments whose occupants would primarily use public transit, or developments whose occupants would travel primarily during off-peak periods. Elsewhere within the Mendenhall Valley, future development should be characterized as medium-to-high density residential, mixed use or commercial developments when contained within transit corridors, defined as lands within a quarter mile of bus routes with headways of no more than one-half-hour during the peak travel periods. Additionally, the Mendenhall Valley intersections that experience LOS E and F should be improved to facilitate transit service therein: This could include bus pull-out lanes, travel lanes exclusive to transit and high-occupancy-vehicles (HOVs) during peak morning and evening traffic periods, or other improvements. Pedestrian pathways are incomplete in much of the Mendenhall Valley area and need to be connected.

Implementing Actions

8.8 - IA10 Work with ADOT&PF to undertake roadway capacity, vehicular turning movement, bus pullouts and pedestrian and bicycle safety improvements within the Urban Service Area where an existing intersection Level of Service on the state route is compromised (LOS D or worse); priority improvements should be given to intersections that would serve new high-density housing developments.

8.8 – IA11 Improve the area between Industrial Blvd. and Fritz Cove Road with a separated pedestrian/ bicycle path and lighting.

8.8 – IA12 Require sidewalks and bicycle paths or lanes along newly constructed arterial and collector streets where appropriate, and provide or work with ADOT&PF to provide such amenities along existing roads to provide safe and efficient access and recreation and to reduce pedestrian/ automobile conflicts.

8.8 - IA13 Work with ADOT&PF to provide a secondary route to Egan Drive where no alternative route currently exists. In particular, support the construction of an extension of Glacier Highway from its current dead-end north of Fred Meyer to the intersection of Glacier Highway and Egan Drive at McDonald's and the Nugget Mall.

8.8 - IA14 Implement the subarea improvements for the Mendenhall Valley called for in the Area Wide Transportation Plan as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding needed to complete those improvements.

Auke Bay and "Out the Road"

West of Auke Bay, the two-lane paved Glacier Highway provides vehicular access to about 600 residents of the rural areas referred to as "Out the Road," as well as recreational enthusiasts, hunters, fisherpersons, and boaters. ADOT&PF maintains this road year-round to milepost 40; the northernmost parts of it are snowbound and inaccessible during winter months.

Implementing Actions

8.8 - IA15 Work with ADOT&PF to undertake transportation improvements to state right-of-ways

within the Auke Bay area pursuant to recommendations included in a CBJ-adopted Auke neighborhood plan. The plan should address existing and anticipated travel demands generated by the ferry terminal, marina, commercial fisheries facilities, affordable housing, expansion of the University of Alaska Southeast, and other destinations located further out the road, and should incorporate the improvements identified in ADOT&PF's 2003 ABCOR (Auke Bay Corridor) study. Extension of existing sidewalks, provision of additional sidewalks, and other safety projects should be high priorities.

8.8 - IA16 Continue to explore the feasibility of constructing a bypass road above Auke Bay from the Mendenhall Valley as envisioned in the 2003 ABCOR study's Alternative Concepts report.

8.8 - IA17 Require sidewalks and bicycle paths or lanes along newly constructed arterial and collector streets where appropriate, and provide or work with ADOT&PF to provide such amenities along existing roads to provide safe and efficient access and recreation and to reduce pedestrian/ automobile conflicts.

8.8 - IA18 Implement the subarea improvements for Auke Bay and "Out the Road" called for in the Area Wide Transportation Plan as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding needed to complete those improvements.

8.8 – IA19 Crosswalks across Glacier Highway in mid-block or unsignalized locations should utilize medians for mid-crossing pedestrian refuges; where present, the existing center turn lane should be eliminated except where it is needed for vehicles to queue for left turns off of Glacier Highway at major intersections. Medians should be used to reduce the number of locations where left turns onto Glacier Highway are possible. Snow removal and storage need to be considered in redesigning the roadway.

8.8 – IA20 Work with ADOT&PF to provide public and improve non-vehicular access to the Alaska Marine Highway System ferry terminal in Auke Bay. Improved wayfinding signage is an important component to these improvements.

Douglas Island

Residential development along the eastern side of Douglas Island in the area between Kowee and Lawson Creeks, called West Juneau, has taxed the capacity of the Cordova Street and Douglas Highway intersection, and has contributed to congestion on the Juneau-Douglas Bridge and the Tenth Street and Egan Drive intersection during the 7 AM to 9 AM week day peak commute periods. An August 2006 weekday analysis of vehicle turning movements at the Tenth Street and Egan Drive intersection by ADOT&PF demonstrated that about half the vehicles from Douglas Island travel to downtown Juneau and half turn left heading toward the Mendenhall Valley. At the very least, the downtown Juneau government agencies employing Douglas Island residents should implement a more effective, and perhaps mandatory, staggered work hour program for those residents to relieve the 7:30 to 8:15 peak morning congestion (LOS F) on the Juneau-Douglas Bridge and Tenth Street and Egan Drive intersection. Another short-term improvement would be the installation of bus pull-outs for Capital Transit buses to leave the travel ways while picking up or dropping off passengers, and where school buses can allow queued vehicles to pass after children are safely on-board or have crossed the street. Notwithstanding these short-term improvements, vehicle capacity improvements to the Juneau-Douglas Bridge and its landing at Tenth Street and Egan Drive will likely be needed to accommodate further residential development on Douglas Island.

The 1995 Comprehensive Plan Land Use Maps for Douglas Island showed a bench road corridor connecting all existing and future communities on the Island; that is, North Douglas, West Douglas, Treadwell/South Douglas, downtown Douglas and West Juneau, with the exception of a link between Fish Creek Road and the New Growth Area community of West Douglas. The Subarea 9 Land Use Maps now show an alignment for this missing link of the bench road. This trans-island bench road remains in the Plan and should be accompanied by a safe pedestrian/ bicycle pathway system linking all Douglas Island communities.

North Douglas

Over the years, North Douglas Highway has experienced increased traffic from recreational users of North Douglas lands, shorelines and waters, in addition to increased resident traffic. Increased traffic is dangerous for pedestrians, joggers, bicyclists and students awaiting school bus service.

The boat launch on the north shore of Douglas Island offers many recreational enthusiasts and visitors a world class, spectacular viewscape of the Mendenhall Glacier and access to world class fishing. Eaglecrest is working to be a year-round outdoor recreation destination. In the years ahead, additional traffic associated with a North Douglas bridge connecting the West Douglas New Growth Area to the mainland may have impacts to the North Douglas Highway traffic capacity and safety, depending on the timing and intensity of development in West Douglas, the location and design of the bridge or crossing landing, and the location and type of roadway(s) leading to and from West Douglas. [Please also refer to Chapter 11, Subarea 9 North Douglas Highway and channel crossing discussions.]

For over twenty years, a North Douglas crossing of Gastineau Channel has been identified as the CBJ's top transportation priority, due to the role this additional access would play in facilitating development of west Douglas Island as well as in providing emergency access in the event the Juneau-Douglas Bridge or another single-route travel corridor in the area (North Douglas Highway or Egan Drive) is inaccessible or out-of-service. Extensive work has been completed on project scoping, data collection for the project's Environmental Impact Statement, and identifying the community preferred alternative. If or when this project moves forward again, the North Douglas neighborhood, the West Douglas Development Working Group, relevant CBJ staff, other interested stakeholder groups and representatives of the community-at-large should participate in a study of the associated transportation elements needed to accommodate the crossing at its landing on Douglas Island, including the location, design and capacity of the crossing landing structure, the road(s) or reserved fixed-guideway right-of-way accommodating the new traffic to and from West Douglas to the mainland via both the new crossing and the existing bridge, and separated pedestrian/bicycle pathways. This study should be accompanied by a neighborhood plan as described in Subarea 9 Guidelines and Considerations in Chapter 11 of this Plan.

Implementing Actions

8.8 - IA21 Encourage ADOT&PF to upgrade North Douglas Highway, with or without a North Douglas bridge and associated arterial roadways, to reduce safety hazards related to the increased traffic on North Douglas Highway due to continuing residential development and increased recreational infrastructure on North Douglas. These improvements may include reduced and consistent speed limits throughout the roadway; installation of better warning signage at curves, bus stops at points with large numbers of residents and/or major destinations; separated pedestrian and bicycle pathways; and pull-off areas for school and public transit buses, if suitable for a minor arterial roadway with over 500 driveway access points.

8.8 - IA22 Work with ADOT&PF to make improvements to roads, intersections and bridges on Douglas Island to accommodate new affordable housing development. Transportation infrastructure deficiencies that should be addressed in the near future include the capacity of the Tenth Street and Egan Drive intersection, particular turning movements at the Cordova Street and Douglas Highway intersection, and the reliance on a single road connection between Douglas Island and the mainland.

8.8 - IA23 Maintain strong municipal support for construction of a North Douglas crossing of Gastineau Channel to accommodate new, compact development of North Douglas and the New Growth Area on west Douglas Island. On the North Douglas landing, the bridge should connect to a roadway that provides sufficient right-of-way to accommodate a future fixed guideway transportation system to West Douglas.

In the near term, the CBJ Community Development Department should conduct a neighborhood planning effort for the North Douglas neighborhood, which would include:

A. Analysis of potential impacts and improvements needed to maintain and enhance the existing character of the North Douglas community. All improvements should be designed to provide adequate capacity to take residents, workers and visitors of Douglas Island to their destinations on the mainland. This may require improvements to the intersectio

of Tenth Street and Egan Drive as well as providing a new northern Gastineau Cha crossing route.

B. Evaluation of the engineering design and costs and the environmental impacts of a North Douglas crossing landing intersection, including the options of the landing intersecting with North Douglas Highway or upland of the Highway at a bench road alignment; and

C. Analysis of the location and configuration of separated pedestrian/bicycle pathways, bus pull-offs and any access road(s) carrying traffic from Douglas Island to the mainland.

8.8 - IA24 Designate potential road and non-motorized trail linkages between residential neighborhoods throughout the Island, where terrain permits and avoiding high-value wetlands whenever possible.

8.8 - IA25 Require sidewalks and bicycle paths or lanes along newly constructed arterial and collector streets where appropriate, and provide or work with ADOT&PF to provide such amenities along existing roads to provide safe and efficient access and recreation and to reduce pedestrian/ automobile conflicts.

8.8 - IA26 Implement the subarea improvements for Douglas Island called for in the *Area Wide Transportation Pla*n as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding needed to complete those improvements.

8.8 – IA27 Investigate providing improved transit service to North Douglas.

Thane Southeast of Downtown Juneau

Thane Road provides vehicular, bicycle and pedestrian access to residential, recreational, tourist-oriented commercial and other non-residential destinations, including a fish hatchery. Thane Road is an approximately six mile, two-lane paved state-maintained roadway that cuts through steep terrain on both sides. There is no separated pedestrian or bicycle lane and there are numerous places where there is no road shoulder, and curves in the road limit motorists' sight lines. The speed limit of the road varies from area to area. The first few miles pass through hazardous avalanche chutes. Despite these constraints and hazards, the road is the sole access for about 175 Thane residents (Census 2000 count) and is extremely popular with joggers, hikers, berry pickers, cyclists and other recreational enthusiasts. A 2012 reconstruction project by ADOT&PF widened and straightened much of Thane Road, but only slightly added to the portion of the road where shoulders are provided. Providing safe facilities for pedestrians and bicyclists along this road remains a high priority. Once the home of the Alaska-Gastineau mining company, and still the location of the Sheep Creek adit, Thane may be affected more profoundly by a proposal to re-open the Alaska-Juneau or Alaska-Gastineau mines than any other subarea.

Implementing Actions

8.8 - IA28 Encourage ADOT&PF to upgrade Thane Road from the CBJ Sewer Treatment Plant to Sheep Creek. All reconstruction of Thane Road should include separated pedestrian and bike lanes which, because of terrain, may need to be located outside of the existing right-of-way and/ or along the shoreline. Where separated paths cannot be constructed, shoulders should be provided.

8.8 - IA29 Require sidewalks and bicycle paths or lanes along newly constructed arterial and collector streets where appropriate, and provide or work with ADOT&PF to provide such amenities along existing roads to provide safe and efficient access and recreation and to reduce pedestrian/ automobile conflicts.

8.8 - IA30 Implement the subarea improvements for Thane called for in the *Area Wide Transportation Plan* as funding becomes available. Where there is a public need for those improvements in the immediate future, actively pursue the funding needed to complete those improvements.

CHAPTER 9
PARKS, RECREATION, TRAILS AND NATURAL AREA RESOURCES

The forms of recreation chosen by residents and visitors in the CBJ are as diverse as the population. Many people choose to recreate in developed parks and facilities, both indoor and outdoor. Others choose to spend time in natural areas where the existence of minimal improved facilities is the most important element. Therefore, planning for the future of parks and recreation facilities involves provision for both organized recreation in urban level facilities, dispersed recreation where improvements are limited to trail systems and, perhaps, destination cabins or, simply, public access to a creek or shoreline. It should be recognized that providing a broad range of recreational experiences involves a cooperative effort between local, state and federal government agencies.

In 1996, the CBJ adopted the *Juneau Parks and Recreation Comprehensive Plan*, which identified community needs, issues, recommended parks and natural area improvements and development standards. In 2007, the Parks and Recreation Department (P&RD) updated Chapter Eight of the *Plan*, which identified recommendations for parks and natural area acquisitions and improvements. From time to time the *Juneau Parks and Recreation Comprehensive Plan* will be updated and amended to keep its policies, guidelines, standards and development plans current and reflective of community needs and desires. That *Plan* contains specific resource information, development standards and recommended improvements for neighborhoods identified by subarea. Each amendment of the *Juneau Parks and Recreation Comprehensive Plan* is reviewed for consistency with this CBJ *Comprehensive Plan* and, therefore, should be reviewed and considered when recommending capital improvements and when reviewing building and use permit applications. Reviewers should also consult the following CBJ-adopted plans when developing or reviewing proposals for parks, open space/natural areas, trails, recreation facilities, capital improvement plans or permit applications:

1. The 2007 Chapter Eight revision to the *Juneau Parks and Recreation Comprehensive Plan*;
2. The 1993 *Juneau Trails Plan*;
3. The 2009 *Juneau Non-Motorized Transportation Plan*; and
4. The 1986 *West Mendenhall Valley Greenbelt Plan.*

Other plans relating to non-motorized transportation or circulation, including the *Safe Routes to Schools Plan*, should also be consulted, although their recommendations do not carry the same weight as those in adopted plans.

In planning for the dispersed portion of recreational opportunities, the P&RD has worked closely with the State of Alaska Division of Parks and Outdoor Recreation, the U.S. Forest Service, the National Park Service, multiple resident groups and individuals to produce the *Juneau Trails Plan.* As a comprehensive evaluation of all the trails in the CBJ area, regardless of land ownership or management authority, this document identifies a wide spectrum of actions from improvement of existing trail conditions to suggestions for construction of new trails or back-country cabins. The general nature of the plan and its long-term look at trail-related issues makes it an appropriate document to include as a companion to this *Comprehensive Plan*.

There has been substantial commercial use of some public trails and destinations in connection with the CBJ's robust visitor industry. This use has resulted in overcrowded conditions and greater maintenance costs on some trails. There is a need to regulate this use and mitigate associated adverse impacts in order to protect the reso

and the quality of the recreation experience for local residents and visitors alike. The P&RD facilitated a Trails Working Group which, in June 2001, published a report entitled *Commercial Use of Trails, Recommendations by the Trails Working Group* that identified which trails within each subarea should be allowed commercial use and the type of use the trail could accommodate; the Trails Working Group provided new recommendations for commercial use of trails in 2004. That report should be updated as needed and reviewed for consistency when considering commercial use permits for CBJ trails.

There continues to be a lack of adequate neighborhood and community parks and facilities in major areas, including the East Mendenhall Valley, Lemon Creek and Switzer Creek areas. While recreational programs are in great demand in the community, the number of facilities to support these programs is insufficient. Planning underway by the P&RD should be coordinated with the Juneau School District, with the involvement of the CDD.

The Eaglecrest ski area, located on Douglas Island, is an important winter recreational resource to many Juneau families. The management of the facility is seeking ways to provide year-round recreational activities for residents and visitors to make more efficient use of its resources.

The Capital Improvement Program Six-Year *Plan* includes a prioritized listing of Parks and Recreation, Eaglecrest, and Centennial Hall projects. Funding is provided primarily through the CBJ budget, with occasional state funding through the legislative process. Other sources of funding should continue to be pursued.

Although Juneau contains a wide variety of outdoor recreational resources, more park and recreational facilities, both indoor and outdoor, should be provided within the urban area. During the community outreach effort of the 2008 *Plan* Update, residents of all neighborhoods (some for different reasons) supported the following new recreational facilities: a swimming pool in the Valley; a performing arts center; and a dedicated ATV/snowmobile course. The Dimond Park Aquatic Center opened to the public in 2011, fulfilling the identified desire for a Mendenhall Valley pool.

Parks and Recreation Facilities

POLICY 9.1. TO PROVIDE QUALITY DISPERSED OUTDOOR RECREATIONAL OPPORTUNITIES AND TO ACQUIRE AND DEVELOP SUFFICIENT LOCAL PARKS AND RECREATIONAL FACILITIES IN LOCATIONS CONVENIENT TO ALL AREAS OF THE CBJ. PLACES GIVEN PRIORITY FOR NEW FACILITIES INCLUDE RAPIDLY DEVELOPING AREAS AND CURRENTLY DEVELOPED AREAS THAT LACK ADEQUATE PARKS AND RECREATION FACILITIES.

Standard Operating Procedures

9.1 - SOP1 Monitor trends in community demographics and incorporate activities specifically related to under-served populations.

9.1 - SOP2 Pursue interdepartmental, interagency and community planning efforts necessary to protect and enhance recreational opportunities in the borough.

9.1 - SOP3 Pursue funding for acquisition and development of parks and recreation facilities through traditional funding mechanisms such as the Capital Improvement Program, the state legislative process, and federal funding opportunities. Maximize the use of federal and state matching funds. Investigate creative and innovative funding mechanisms for the acquisition and development of parks, facilities, trails and programs. Explore cooperative management agreements, joint ventures, private/public partnerships or other protocols to facilitate progress.

9.1 - SOP4 Cooperate with the School District and Parks and Recreation Department to plan for joint use of neighborhood and community parks, community and school facilities, and sports fields by the students and general public.

9.1 - SOP5 Provide outreach programs directly to youth; bring programs to the neighborhoods.

9.1 - SOP6 Support and seek to expand resources for Youth Activity Grants and scholarships for this program.

9.1 - SOP7 Officially welcome participants and otherwise encourage large regional sporting events such as the Gold Medal Basketball Tournament.

9.1 – SOP8 Utilize a permit system for commercial use of public lands that includes commercial user fees as part of the funding source for dispersed recreation development and maintenance costs. Consider the cost of operation and maintenance of the resource, when establishing or revising a commercial user fee.

9.1 – SOP9 Work with local non-profit, volunteer, and advocacy groups to efficiently provide supportive services and maintenance of trails and other recreational facilities in the community. In the event that such groups are unable to continue to provide the current level of support, consider community needs and available resources before providing or eliminating the provision of needed support.

Development Guideline

9.1 - DG1 Ensure that proposed commercial use of public trails and their environs is consistent with the P&RD *Commercial Use of Trails* report.

Implementing Actions

9.1 - IA1 CDD staff should work with P&RD staff and interested parties to develop thresholds and standards in the Land Use Code for construction of playgrounds and trail linkages by developers to serve their proposed new subdivisions and residential developments, taking into account existing facilities within the area, proposed development population play and recreation needs, and size of the proposed development. CDD and the P&RD should work with developers to address neighborhood park needs. P&RD and CDD staff should work cooperatively to monitor commitments by developers of new residential developments that may fulfill a condition of the development. These may include construction of new trails and playgrounds. CDD should work with P&RD to monitor existing community improvements in permitted residential developments.

9.1 - IA2 Establish one or more discrete zoning districts in the CBJ Title 49 Land Use Code for CBJ-owned lands dedicated to parks and recreation and natural area uses. These new zoning districts would correspond to the CA (Conservation Area), SC (Stream Protection Corridor), and NP (Natural Area Park) land use designations of this *Plan*. Amend the zoning map to place those zoning designations on the CBJ-owned lands dedicated to those uses.

9.1 - IA3 Initiate a needs assessment with state, CBJ and federal agencies to assess recreational needs; of particular concern are the expressed needs for (1) lighted cross-country ski trails where snowmobiles are not permitted; (2) an off-road-vehicle track and trail network, and (3) a performing arts center in downtown Juneau.

9.1 - IA4 Provide a centralized recreation program registration venue at a location that is convenient to residents, that is accessible by all modes of transport, and is provided with adequate parking.

9.1 - IA5 The P&RD should participate in the planning for new school development to ensure maximum community recreation utility in the design of community rooms, gymnasiums, playgrounds, and sports fields.

9.1 - IA6 Ensure that new facilities, programs, and equipment are designed to meet the needs of the disabled community, and that the facilities provide a variety of services for all people with disabilities.

9.1 - IA7 Identify traditional and high quality waterfront access areas, recreational anchorages and beaches, beach trail opportunities, boat launch areas, and waterfront park sites. Coordinate with the CBJ Docks and Harbors, Land & Resources, CDD, and State of Alaska to assure that public access to water is provided.

9.1 - IA8 CDD and P&RD should work to permanently protect CBJ's Natural Area Parks and Conservation areas. P&RD should initiate a pilot Forever Wild program.

9.1 - IA9 Identify locations within the borough that provide good, publicly-accessible night sky vie opportunities and develop those locations with seating, parking and other facilities and protect those locations from light pollution and intrusion.

9.1 - IA10 Complete a camping plan for the borough that identifies a range of camping facilities including highly developed RV campgrounds, remote cabin sites, and primitive campsites.

9.1 - IA11 Investigate the location and number of mini-parks needed in the community and construct new mini-parks as needed.

9.1 - IA12 Seek location and construction for an ATV/snowmobile course with a programmed riding course as well as trails.

9.1 - IA13 Re-establish the Trails Working Group , or an equivalent group, to address commercial activities on CBJ park land.

9.1 - IA14 Support the establishment of dog parks, per the P&RD Dog Task Force's recommendations.

9.1 - IA15 Identify all parks with signage.

9.1 - IA16 Implement the replacement schedule for playground equipment and include accessible equipment in all new purchases.

9.1 - IA17 Plan park renovation projects to address changing recreational needs.

9.1 - IA18 Enhance the beauty and livability of the community by augmenting the CBJ landscaping program.

9.1 - IA19 Work cooperatively with agencies such as the Alaska State Museum, the Historic Resources Advisory Committee, and Gastineau Channel Historical Society to manage activities at the City Museum, the Last Chance Basin Mining Museum, the University of Alaska Southeast, the Alaska State Museum, and other similar venues.

9.1 - IA20 Promote development of a performing arts facility that will meet a wide variety of needs.

9.1 - IA21 Incorporate park lands in developing areas through designation of publicly owned lands, acquisition of private lands, or dedication of lands during the subdivision process.

9.1 - IA22 Develop a GIS map layer that clearly labels developed or designated open space/natural areas, greenbelts, parks, playgrounds and beach access points.

9.1 - IA23 Develop parks and recreation facilities, for both urban level and dispersed recreation, based on the community's unique characteristics, needs, and traditions. In developing dispersed recreation opportunities such as fish and wildlife viewing areas and increased sport fishing opportunities, recognize the importance of habitat and sensitive area protection.

9.1 - IA24 Encourage development of additional facilities at, and provision of electric energy from the CBJ's existing electrical grid, to the Eaglecrest ski area.

9.1 - IA25 Consider options for enhancing shoreside recreational fishing opportunities when planning new city parks, docks, trails, infrastructure, and related developments.

Interconnected Trail System

One of the most frequent responses to the community values and opinion surveys conducted as part of the 2008 *Plan* Update was the desire for access to nature in the uplands, forests and the waterways. This access was desired for both human travel and enjoyment and for the health, welfare and sustainability of fish and wildlife. Residents suggested that an un-fragmented trail system located in both developed and undeveloped areas could be sited and designed in such a way as to assure access for fish and wildlife (flora and fauna) from the icefields to the sea, while providing non-motorized trails for local residents and visitors. The fish and wildlife portion of the system could follow the various anadromous fish streams linking the icefield, through the forested areas, to the sea. Those fish and wildlife corridors could be intersected by a regional non-motorized trail system, thereby assuring access

to nature for all residents, human and non-human. This dual-purpose recreational trail/fish and would assure the most critical habitat for fish and wildlife and could be a receiving area for habitat mitigation. Land outside these corridors and this trail system could then be considered "buildable," if properly mitigated.

POLICY 9.2. TO DEVELOP AND MAINTAIN AN INTERCONNECTED NON-MOTORIZED TRAIL SYSTEM THAT IS COMPLEMENTARY WITH, AND MAY BE CONTIGUOUS WITH, UN-FRAGMENTED FISH AND WILDLIFE CORRIDORS ALONG ANADROMOUS FISH STREAMS WITHIN THE ROADED AREA THAT PROVIDES FISH AND WILDLIFE AND HUMAN ACCESS TO THE SEA FROM THE UPLANDS.

Standard Operating Procedures

9.2 - SOP1 Consider the impacts of new development on trails identified in the *Juneau Trails Plan* when reviewing Capital Improvement Plans and permit applications. Seek to implement the *Plan's* recommendations to establish an un-fragmented trail system throughout the roaded area of the CBJ.

9.2 - SOP2 Cooperate with the State of Alaska and the U.S. Forest Service to encourage the establishment of recreational and open space/natural areas facilities and areas.

Implementing Actions

9.2 - IA1 Working with state and federal agencies, create a GIS trail map. On the CBJ GIS system, identify un-fragmented fish and wildlife corridors along the adopted CBJ list of anadromous fish streams that extends from the Juneau Icefield and other upland areas to the sea. Within the roaded areas of the borough, and when compatible with wildlife passage within the corridors, identify an un-fragmented trail network for non-motorized travel by humans within these wildlife corridors.

9.2 - IA2 When reviewing capital improvement plans and building or use permit applications, seek to protect lands necessary to establish and/or maintain the un-fragmented fish and wildlife corridors and trail network. This may include the dedication of conservation easements or "no build" zones within a development as well as dedication provision of public access through the trail easements.

9.2 - IA3 Improve and expand the community's trail system to provide an un-fragmented trail system that offers opportunities for a wide range of experiences, safety of the users, and protection of fish and wildlife habitat.

9.2 - IA4 Prioritize construction and maintenance of existing trails including: repair of unsafe conditions, repair of resource degradation; enhancements that allow for greater utilization; construction of new trails that provide connections and construction of new trails in anticipation of future needs.

9.2 - IA5 Continue partnering with federal, state and local agencies in the maintenance and development of trails through the non-profit organization, Trail Mix, Inc., or its equivalent.

9.2 - IA6 Implement the tri-agency *Juneau Trails Plan* and update it as necessary.

9.2 - IA7 Implement adopted *Non-Motorized Transportation Plan* items in subareas, and update as new subdivisions are constructed.

9.2 - IA8 Work with the ADOT&PF, the CDD, the Engineering Department, and other relevant agencies to ensure that future right-of-way construction includes adequate pedestrian and bicycle facilities, and that existing neighborhoods are connected by a network of non-motorized corridors.

9.2 - IA9 Support the designation of federal funds for trail development, as provided for by MAP-21 or other federal apportionments and allowances.

Natural Areas

Natural, undeveloped areas (formerly referred to as "open space") are an essential component of the CBJ's community form and identity. They should be maintained and enhanced. Shoreline areas are a major coastal fish and wildlife habitat, offer a valued view corridor, and can function as valuable natural recreational resources; most are publicly owned. Among the most dramatic, and often visited, locales to enjoy spectacular views of scenic destinations are the Mendenhall Glacier visitor center, the Mount Roberts Tram, and the view of the Mendenhall Glacier from the waterfront roadway from the North Douglas boat launch facility to False Outer Point. These vista points should be preserved and enhanced with low-impact visitor facilities such as parking areas, bike paths and trails.

The West Mendenhall Valley Greenbelt has been established, beach access routes have been identified and signs put in place, and there have been improvements made for recreational access to Echo Cove and Amalga Harbor.

The CBJ government should maintain awareness of, and educate the public to, the importance of natural areas in land use and development decisions. Valuable habitat areas within the borough require retention of vegetation and water resources. Inadequately regulated development degrades habitat values and scenic resources. The quality of residential developments is enhanced by standards and policies to preserve natural areas. Demand for outdoor recreational opportunities is generated by both resident and visitor populations. Some of the valued community assets most frequently expressed by residents during the 2007 *Plan* Update public opinion survey were (1) preservation of the community's natural beauty and scenery; (2) provision of public access to the water and wilderness areas; and (3) protection of streams and wildlife corridors.

POLICY 9.3. TO PRESERVE AS PUBLIC NATURAL AREAS THOSE PUBLICLY-OWNED LANDS AND SHORELINE AREAS THAT POSSESS IMPORTANT RECREATIONAL, SCENIC, FISH AND WILDLIFE, AND OTHER ENVIRONMENTAL QUALITIES OR ARE SUBJECT TO NATURAL HAZARDS.

Standard Operating Procedures

9.3 - SOP1 Designate public areas and sites recommended in the 2007 Update of Chapter 8 of the *Juneau Parks and Recreation Comprehensive Plan* for permanent public access and use. Work toward acquiring privately-owned land through dedication, donation or purchase. Develop legal descriptions and revise the zoning map accordingly.

9.3 - SOP2 Acquire land or regulate its use as necessary to protect the public from natural hazards and to preserve sensitive natural resources.

9.3 - SOP3 Encourage relevant state agencies to adopt open space/natural areas management policies for state land and tidelands indicated in the *Juneau Parks and Recreation Comprehensive Plan*. Initiate cooperative management agreements proposed in the plan.

Implementing Actions

9.3 - IA1 Where regulatory actions are inappropriate, acquire easements through dedication, donation, or purchase of privately-owned streamside lands and other areas indicated in the *Juneau Parks and Recreation Comprehensive Plan*.

9.3 - IA2 Revise the Land Use Code to establish a Scenic Corridor/View Overlay District that would be mapped to include the lands designated on the Comprehensive Plan Land Use Maps with the Scenic Corridor/Viewshed (SCV) land use designation.

CHAPTER 10
LAND USE

Land use policies implement important decisions relating to community form, housing, economic and community development, natural resource protection and hazards prevention. They also are the basis for the land use maps in Chapter 11. In this chapter, land use policies are divided into two major categories: residential, and commercial/industrial. Policies for natural areas, recreation, and parks appear in the preceding Chapter 9 and Guidelines for those resources are also found in the discussion of Subareas in Chapter 11.

These policies should guide the CBJ government in adopting appropriate regulatory measures, making consistent land use decisions, and investing in public facilities for residential and commercial/industrial development. CBJ Title 49, the Land Use Code, which incorporates zoning standards, regulations, maps and permit processes, and the CBJ Capital Improvement Program (CIP) are the primary means of implementing these policies. Through the CIP, the CBJ government can plan for and develop the necessary public facilities and services—roads, sewers, utilities, schools and others—in a timely and orderly manner. Land use policies should assist the CBJ government in its efforts to provide a variety of housing, to pursue opportunities for suitable residential and economic development and redevelopment, and to promote conservation and rational development of natural resources.

RESIDENTIAL USE OF LAND

[Please also see Chapter 3, Community Form, and Chapter 4, Housing Element, of this Plan]

Residential Land Availability and Density

A substantial revision of land zoned for residential uses was accomplished in 1987 to bring the zoning map into conformance with the 1984 Comprehensive Plan. The CBJ government should continue to conduct re-zoning processes to reflect the land use designations and densities recommended in this 2013 update. Most specifically, higher density residential developments along public transit routes are needed to satisfy affordable housing needs, to make the most efficient use of a limited amount of buildable land, and to provide public services efficiently therein.

Availability of lands for residential use should continue to be monitored and adequate public service and facilities provided to accomplish the objectives of assuring safe, sanitary and affordable housing for all income levels and household types in the community.

POLICY 10.1. TO FACILITATE AVAILABILITY OF SUFFICIENT LAND WITH ADEQUATE PUBLIC FACILITIES AND SERVICES FOR A RANGE OF HOUSING TYPES AND DENSITIES TO ENABLE THE PUBLIC AND PRIVATE SECTORS TO PROVIDE AFFORDABLE HOUSING OPPORTUNITIES FOR ALL JUNEAU RESIDENTS.

Standard Operating Procedures

10.1 - SOP1 Monitor land use designations to ensure sufficient land available to meet current and projected needs for residential development in areas with existing or projected municipal water and sewer service, arterial access, public transit service, and other adequate public facilities and services.

10.1 - SOP2 Designate sufficient land on the *Comprehensive Plan* Land Use Maps and zoning maps to p for a full range of housing types and densities desired by resident households. Provide choices in residential neighborhood character such that residents can choose to live in urban, suburban and rural residential settings and neighborhoods.

10.1 - SOP3 Prepare and implement a Capital Improvement Program for sewer service, transit service, roads, bridges, traffic intersection improvements and other public facilities and services to serve:

A. Existing residential areas;

B. Areas with potential for in-fill development; and,

C. Other areas within the CBJ's Urban Service Area that may be suitable for immediate (within the next five years) residential development with sufficient densities to produce low or moderate income affordable housing.

10.1 - SOP4 Use CBJ-owned lands as an important means of providing sufficient land for low- to moderate-income affordable residential development while ensuring that the new, affordable units remain so long-term. Implement the CBJ *Land Management Plan*, which phases disposal of such lands in accord with projected needs and bases their use on applicable policies of the *Comprehensive Plan*, such as housing, economic development, natural resource protection, hazard abatement, natural areas, community gardens and parks.

Implementing Actions

10.1 - IA1 Identify CBJ-owned lands that are suitable to release for development of affordable housing and develop a procedure, by grant, lottery or sale, to convey this land to a residential builder who would produce the affordable housing as soon as possible after necessary infrastructure is in place.

10.1 - IA2 Identify, with neighborhood participation, development plans, densities and design parameters of development projects suitable for CBJ-owned buildable sites identified per 10.1 - IA1 and re-zone the land with performance standards to assure its development according to the recommended design and densities.

10.1 - IA3 Identify, design, fund and complete the construction of capital improvements needed to facilitate the development of affordable housing on CBJ-owned lands.

POLICY 10.2. TO ALLOW FLEXIBILITY AND A WIDE RANGE OF CREATIVE SOLUTIONS IN RESIDENTIAL AND MIXED USE LAND DEVELOPMENT WITHIN THE URBAN SERVICE AREA.

Implementing Actions

10.2 - IA1 Continue to revise the Land Use Code to define and allow, where appropriate, a variety of housing types and to facilitate their location in suitable locations. A diverse mix of housing types should be accommodated and facilitated in the community including, but not limited to, small Single Room Occupancy (SRO) units or their equivalent compact living unit type; loft housing; live-work units; artist studio housing in commercial or industrial structures; float homes, houseboats, and live-a-boards; panelized, modular, "kit," and manufactured homes on permanent foundations; and other types of housing suitable to diverse residents' lifestyles and budgets.

10.2 - IA2 Review the existing multifamily zoning districts along transit corridors to increase density limits, reduce parking requirements for residential units, decrease lot sizes, and to allow a wider range of housing types including modular or manufactured homes, accessory apartments, live/work units, loft-style dwellings, and co-housing types.

10.2 - IA3 Seek the adoption of state and/or CBJ ordinances, regulations and operating procedures necessary to facilitate the redevelopment of underdeveloped properties, obsolete or substandard developments, or otherwise constrained or blighted lands located within the Urban Service Area for higher-density housing or mixed use projects, particularly those lands located within transit corridors that could provide affordable housing.

10.2 - IA4 Revise the Land Use Code to allow small-scale renewable energy facilities, such a and wind turbines, as well as green houses for household food production on individual lots. Small-scale energy conservation, water conservation and subsistence farming facilities should be supported on residential lots and in residential neighborhoods throughout the borough.

Residential Location

This *Comprehensive Plan* provides criteria for locating various densities of residential land use in the land use plan maps and guides future decisions related to these matters.

POLICY 10.3. TO FACILITATE RESIDENTIAL DEVELOPMENTS OF VARIOUS TYPES AND DENSITIES THAT ARE APPROPRIATELY LOCATED IN RELATION TO SITE CONDITIONS, SURROUNDING LAND USES, AND CAPACITY OF PUBLIC FACILITIES AND TRANSPORTATION SYSTEMS.

Standard Operating Procedures

10.3 - SOP1 Designate various categories of residential density on the *Comprehensive Plan* Land Use Maps and the Land Use Code maps based on evaluation of the following criteria:

A. Physical site conditions including slope, areas of natural hazard, wetlands, watershed value, and/or high value natural resources;

B. Access and capacity of adjacent streets and intersections. Arterial streets should have limited, and controlled, access from local or collector streets;

C. Availability of public facilities and services, especially municipal water and sewer systems and, for low- to medium-income affordable housing or high-density residential development, proximity to public transit;

D. Compatibility of the various zoning districts and land use designations with the scale and massing of surrounding neighborhoods with regard to building height and orientation, but not necessarily with regard to similar density, as the CBJ seeks to make the most efficient use of residentially-buildable lands;

E. Potential of specific sites to accommodate the proposed density including size and shape of property and adequacy of internal circulation, parking, screening and privacy; and/or,

F. Distance from incompatible land uses that may generate offensive or nuisance off-site impacts to new residential development, including noise, dust, fumes, malodors and/or heavy truck traffic.

Avoiding Residential Land Use Conflicts

A major concern expressed by Juneau residents is the need to protect the character of existing neighborhoods from incompatible uses. Their primary concern is to minimize the intrusion of heavy traffic on neighborhood streets and avoid conflicts related to parking congestion, noise, glare, loss of privacy and other factors associated with higher intensity uses.

POLICY 10.4. TO MINIMIZE CONFLICTS BETWEEN RESIDENTIAL AREAS AND NEARBY RECREATIONAL, COMMERCIAL, OR INDUSTRIAL USES THAT WOULD GENERATE ADVERSE IMPACTS TO EXISTING RESIDENTIAL AREAS THROUGH APPROPRIATE LAND USE LOCATIONAL DECISIONS AND REGULATORY MEASURES.

Development Guidelines

10.4 - DG1 New development, particularly in-fill development on vacant land within established neighborhoods, should be designed in such a way as to promote compatibility in scale and massing as the adjacent or nearby built environment and should ensure privacy, light and air to adjacent homes. Density alone should not be considered as a criterion for determining neighborhood harmony within the Urban Service Area provided that:

A. Light, air and privacy is assured to adjacent residential occupants;

B. Parking for the subject project is screened or hidden from view from public streets and from adjacent residential neighbors; and,

C. Project-serving roads and intersections are improved to a Level of Service D or better. When these criteria are met, higher density development is encouraged.

10.4 - DG2 When a developer extends public or private utilities and infrastructure, such as sewer service, roads or electrical lines, to a particular parcel or development, care should be taken to ensure that adjacent lands and infrastructure that would be affected by the new development are adequately improved by the developer to accommodate the proposed project's traffic as well as new traffic or use anticipated by the growth-inducing impacts of such services or infrastructure extensions. For example, when a water or sewer main or road is extended to a property, it should be sized to serve development at a similar scale and density on adjoining properties.

Implementing Actions

10.4 - IA1 Seek to reduce or eliminate conflicts between medium or high density residential uses in established low density residential neighborhoods by encouraging the design of higher density housing to be compatible in scale, massing and orientation with the adjacent, lower-density housing and to hide or screen the parking behind or within the structure(s).

10.4 - IA2 Maintain and consider enhancing Title 49 Land Use Code requirements for buffering and screening between residential and commercial/industrial uses and careful review of site development plans. Great care should be taken to incorporate design features, materials and good neighbor operating practices into the non-residential development permit in order to mitigate potential adverse noise, dust, odor and glare impacts to adjacent residential neighbors. Such operating practices should be incorporated as conditions of any permit for a non-residential land use located within 200 feet of a residential use or neighborhood.

10.4 - IA3 Consider establishing a new Noise Notification Overlay District that encompasses lands near enough to be affected by uses known to generate nuisance noise, such as: gravel extraction areas, landfill sites, outdoor shooting ranges, airports and heliports. Within this overlay district, property owners should be required to notify prospective tenants and/or purchasers of the presence of these land uses and their potential noise impacts. Also consider amending Title 19, the Building Code, to require adequate noise mitigation in building design and construction within this overlay district.

10.4 – IA4 Encourage mixed-use waterfront development that minimizes view obstruction of existing development and/or important viewsheds.

Neighborhood Facilities

It is essential that adequate public facilities be available to support planned and needed residential development in the CBJ and to assure that high quality neighborhoods are maintained and established. Both the private and public sectors are responsible for providing such facilities. It is also important to provide land or space for convenient shopping, services, and public spaces such as parks, playgrounds, and community gardens within walking distance of new neighborhoods to reduce consumption of fossil fuels and our contribution to climate change.

POLICY 10.5. THAT RESIDENTIAL DEVELOPMENT PROPOSALS, OTHER THAN SINGLE-FAMILY RESIDENCES, MUST BE LOCATED WITHIN THE URBAN SERVICE AREA BOUNDARY OR WITHIN A DESIGNATED NEW GROWTH AREA. APPROVAL OF NEW RESIDENTIAL DEVELOPMENT PERMITS DEPENDS ON THE PROVISION OR AVAILABILITY OF NECESSARY PUBLIC AMENITIES AND FACILITIES, SUCH AS ACCESS, SEWER, AND WATER.

Standard Operating Procedures

10.5 - SOP1 Encourage public/private partnerships in the development of new subdivisions with roads, intersections, separated pedestrian and bicycle pathways/trails, water and sanitary sewer systems that meet adopted CBJ standards.

10.5 - SOP2 Maintain the provisions in the Land Use Code that require developers to provide for access, facilities, and services prior to final plat approval.

10.5 - SOP3 Amend the Land Use Code to allow appropriate urban densities in areas served by community sewer and water systems, being cognizant of the desire to maintain the rural, suburban or urban character of the existing surrounding neighborhoods.

10.5 - SOP4 Encourage the location and design of small-scale commercial developments that provide convenient shopping and personal services within or near residential neighborhoods. The building and parking siting and design should ensure mitigation of noise, light and glare, odor and litter impacts to adjacent residential neighborhoods. Any neighborhood-commercial development should be accessible via improved pedestrian and bicycle routes and should provide secure and dry bicycle racks.

Implementing Actions

10.5 - IA1 Develop a Capital Improvement Plan to extend facilities and services to areas within the Urban Services Area planned for medium to high density residential development. Priority for capital improvements for road access, municipal water and sewer services should be given to land areas that can accommodate the densities that support affordable housing units (minimum 10 units per acre) or to properties on which affordable housing projects are proposed.

10.5 - IA2 Develop infrastructure that supports low- and moderate-income affordable housing developments on municipally-owned lands.

Residential Project Design

CBJ residents support measures that will assure the development of high quality, livable neighborhoods. To accomplish this, regulatory measures and incentives are needed to encourage or require, where necessary, developers to use high-quality site design procedures. Title 49, the CBJ Land Use Code, has many requirements intended to achieve this assurance. Maintenance and enhancement of these requirements will increase physical amenities; protect open space/natural areas; shelter residential areas from adverse impacts of major streets or incompatible land uses; provide for sustainable, energy-efficient transportation opportunities; and improve traffic safety.

POLICY 10.6. TO REQUIRE NEW RESIDENTIAL DEVELOPMENTS TO MEET MINIMUM CRITERI OVERALL SITE DESIGN INCLUDING PROVISION OF LIGHT, AIR AND PRIVACY.

Implementing Actions

10.6 - IA1 Continue existing incentives and develop additional incentives to encourage and reward excellence in site design and provision of amenities or facilities, particularly those related to preservation of natural terrain and vegetation, building orientation to maximize energy efficiency and privacy, and screening the parking in medium-to-high density developments. These incentives may include lower permit fees and/or permit expediting services.

10.6 - IA2 The CDD should improve the development review process to require all applications for major residential developments, including major subdivisions, to provide detailed site information at the pre-application stage of review that identifies existing on-site slopes, soil characteristics, natural hazards, drainage channels, locations of old growth trees, access to streets and public utilities, and existing buildings or historic resources, along with the proposed building(s) pads, lot configuration(s), drainage systems, and new road configurations. This pre-application review would focus the site and project analysis and would expedite the review process once the application is made.

10.6 - IA3 The CDD should work with the CBJ Parks and Recreation Department to establish within the Land Use Code a set of criteria for the provision of active play areas in multifamily residential developments, along with development standards for developers to adhere to in constructing, maintaining, and replacing those facilities.

10.6 - IA4 Amend the Land Use Code to ensure that development proposals are evaluated with regard to site design, including:

A. Preservation of anadromous fish streams, high-value wetlands, natural terrain features, and historic resources;

B. Provision and/or retention of buffers between residential and commercial or industrial uses, and between high- and low-density residential uses to ameliorate noise, glare, and to otherwise reduce negative impacts associated with conflicting land uses in proximity to one another;

C. Safe and convenient circulation for autos, pedestrians, and bicycles;

D. Building placement that respects the terrain, maximizes light, air, and energy efficiency, as well as protecting the privacy of neighbors; and,

E. Consideration of compatibility factors related to surrounding land uses and public facilities.

COMMERCIAL AND INDUSTRIAL USE OF LAND

Commercial and Industrial Land Availability

The City and Borough's distance from national markets, size of the labor force, lack of land-route access and the resulting costs of importing raw materials, as well as the limited amount of renewable natural resources to market to the outside world all impose serious limits to the growth of manufacturing and distributive industrial activities within the community. However, the provision of land for commercial office, retail and tourism-related developments has allowed Juneau businesses to capture a large share of the local market for retail goods and services, thereby reducing the "leakage" of disposable income to the outside world. Juneau also serves as a regional destination for goods and services from residents and business operators living in neighboring towns and villages. The community's historic sites, cultural diversity, natural habitats and scenic beauty have strengthened Juneau's position as a major tourist destination, particularly for eco-tourism, outdoor adventure tours and historic destinations. These resources provide the community with a comparative advantage over other destinations in the

state for these shopping, service, and tourism dollars, resulting in local employment and tax revenues to support public services and infrastructure.

Commercial and industrial uses in the borough range from neighborhood-scale retail to resource extraction heavy industries (minerals, sand and gravel). Commercial fisheries, food processing (seafood and beer) and construction industries maintain a strong presence, although nearly every business sector reports that the lack of affordable housing stymies attraction and retention of employees and, therefore, expansion of their businesses.

About 40 percent of local employment consists of government workers, including local, state and federal agencies, the school district, and the University of Alaska Southeast (UAS). Water-dependent fisheries, transport, shipping, marine-support businesses and recreational or eco-tourism businesses remain important activities in the CBJ. Downtown Juneau remains an important destination for visitors, for local entertainment, ceremonial gatherings and meetings, arts and cultural events, as well as for dining and shopping. The airport area and the area east of the juncture of the Mendenhall River and Glacier Highway are major centers of retail activity. Smaller commercial centers or nodes can be found in Douglas, Lemon Creek, Salmon Creek, and Auke Bay.

The community seeks to balance its economy by supporting its government, service, retail and tourism industries while strengthening and facilitating the expansion of its research and export industries (e.g., food processing, manufacturing, and mineral extraction). To do so, the CBJ government must designate sufficient vacant land to meet future demand for commercial, personal and business services, and institutional, cultural, artistic, and industrial activities. Determination of location and size of commercial and industrial districts should be based on the spatial needs and locational criteria of each sector, as well as the characteristics and features of available vacant land. Typically, retail and office centers seek locations with access to, and visibility from, major thoroughfares. Public transit services should be provided to major employment and shopping areas. Manufacturing and food processing industry seeks flat, dry land located some distance from residential uses yet near roads with heavy load-carrying capacities. Unfortunately, about half of the industrially-zoned lands within the Urban Service Area are or contain wetlands and are largely unsuitable for development. Unfortunately, too, the search for buildable lands conducted for the 2008 Plan Update identified very little potential industrial land suitable for development in the short-term; lands found to be suitable for development in the near future include current and former gravel extraction areas.

POLICY 10.7. TO DESIGNATE ON LAND USE AND ZONING MAPS, AND TO PROVIDE SERVICES TO, SUFFICIENT VACANT LAND WITHIN THE URBAN SERVICE AREA APPROPRIATELY LOCATED TO ACCOMMODATE FUTURE COMMERCIAL AND INDUSTRIAL USES.

Standard Operating Procedure

10.7 - SOP1 Review local economic indicators and conduct periodic surveys and analyses of the space needs of commercial and industrial sectors in Juneau and, when appropriate, allocate sufficient land and infrastructure to support the expansion and/or relocation needs of those sectors of the economy.

Development Guidelines

10.7 - DG1 In drafting ordinances and resolutions, the CBJ government should favor basic industry, locally-based, and/or independent businesses that would provide employment for local residents over other businesses that would not provide those resources, to the extent allowed by law.

10.7 - DG2 When designating land for heavy and light industrial uses on the Comprehensive Plan Land Use Maps and the Land Use Code zoning maps, evaluate the sites based on the following criteria:

A. Physical site conditions: Industry needs flat, dry land with soils that can sustain heavy loads;

B. Access and capacity of adjacent streets with consideration for heavy-load-carrying capacity and wide turning radii to accommodate large truck turning movements;

C. Distance from sensitive receptors, such as homes, schools and hospitals, to potential off-site impacts generated by industry including noise, dust, fumes, odors and nighttime light glare;

D. Residential, retail, office, personal service and similar non-industrial uses should be permitted within heavy industrial districts although light industry such as building contractors, repair services, storage yards and similar business and household services would be compatible with heavy industrial uses;

E. In areas suitable for light industry but not for heavy industry due to proximity to sensitive receptors, retail, office, bars and restaurants, and personal services uses would be compatible uses; and

F. Residential uses, other than caretaker units, should be prohibited in industrial zones.

10.7 - DG3 Ensure adequate infrastructure for projected commercial and industrial development through the Capital Improvement Program and transportation planning.

10.7 - DG4 The Industrial Boulevard industrial area should remain in light and heavy industrial use rather than convert to, or be incrementally encroached upon by, retail, office or residential uses.

Implementing Actions

10.7 - IA1 Maintain and improve design review procedures to ensure that proposals for commercial (retail, office and institutional) development are evaluated with regard to site design, building placement, parking, landscaping, exterior lighting, screening and buffers, signage and other factors related to surrounding properties, land uses and public facilities.

10.7 - IA2 Identify and protect from land use conflicts potential sites for light industrial and heavy industrial uses.

10.7 - IA3 Designate land for community-scale food production, processing, and distribution. [see also 10.11 - IA3]

Regional Trade, Medical Services and Visitor-Destination Uses

An important economic engine for Juneau is the attraction of regional, state, national and international visitors to the borough. Although the community hosts a robust summer-season cruise ship visitor industry that bolsters the CBJ's sales tax revenues, this sector does not provide full-time, year-round employment for local residents: the seasonal cruise industry heavily impacts residential and commercial rents, recreational destinations, roadway congestion, and the level of noise in downtown and neighborhoods. In response, business operators within the visitor industry have instituted a volunteer "Tourism Best Management Practices" (TBMP) program to control and minimize adverse noise, traffic, air and water quality impacts of their industry.

Ensuring the authenticity of Juneau, as characterized by its natural habitats, beautiful scenery, cultural richness, and history will strengthen our comparative advantage as a premier destination in the visitor industry.

Many residents and business operators from small towns and villages within the Southeast Region make monthly or quarterly visits to Juneau to purchase goods and services that are not found within their home towns. This regional trade is an important year-round market for local retail and service businesses as well as medical service providers. Facilitating this visitor and regional trade is vital to achieving a balanced economy in the community.

POLICY 10.8. TO ENCOURAGE AND STRENGTHEN JUNEAU'S POSITION AS A REGIONAL TRADE CENTER FOR SOUTHEAST COMMUNITIES.

Standard Operating Procedure

10.8 - SOP1 Facilitate regional trade by allowing wholesale and retail trade centers and hotels and motels near marine and aviation transportation hubs such as the airport and barge and ferry terminals.

Implementing Action

10.8 – IA1 Implement public transit service to and from the Alaska Marine Highway System ferry terminal.

POLICY 10.9. TO ENCOURAGE AND STRENGTHEN JUNEAU'S POSITION AS AN IN VISITOR DESTINATION BY PROTECTING THE RESOURCES AND ASSETS THAT MAKE IT ATTRACTIVE TO VISITORS, INCLUDING ITS NATURAL ENVIRONMENT, SCENIC BEAUTY, CULTURAL DIVERSITY, HISTORIC RESOURCES AND DIVERSITY OF ACTIVITIES AND EXPERIENCES. VISITOR DESTINATIONS SHOULD CONVEY AUTHENTIC JUNEAU WILDERNESS, RECREATION, HISTORY AND CULTURAL ARTS EXPERIENCES WHILE PROTECTING THOSE RESOURCES FROM OVERUSE AND DEPLETION.

Standard Operating Procedure

10.9 – SOP1 Cooperate with state and local museums, cultural venues, the Juneau Arts and Humanities Council, the Juneau Convention and Visitor's Bureau, and Centennial Hall staff to publicize and promote authentic Juneau and Alaska experiences and opportunities for visitors.

Development Guideline

10.9 - DG1 When reviewing permits for visitor destinations and related tourism industry activities, identify and seek to mitigate off-site impacts.

Implementing Actions

10.9 - IA1 Investigate and potentially adopt regulatory tools to encourage the development and operation of year-round businesses and commercial visitor destinations, especially those that would provide authentic regionally-made goods and services in prominent locations within the development.

10.9 – IA2 The Community Development, Parks and Recreation, and Lands Departments should identify potential sites for new or expanded recreational vehicle parks, campgrounds and related facilities and appropriately designate those lands for those uses on the Comprehensive Plan Land Use Maps.

10.9 – IA3 The CBJ should support citizen initiatives investigating ways to revitalize the downtown Juneau area.

Neighborhood Commercial Uses

The community recognizes the need for appropriate small-scale commercial development to serve neighborhoods. The Land Use Code contains specific provisions to allow small-scale commercial retail establishments to be located in residential areas. There are a number of locations in the borough where additional such "Mom and Pop" stores would be appropriate to provide convenience goods and services for nearby residents to walk or cycle to patronize.

POLICY 10.10 TO ENCOURAGE SMALL-SCALE NEIGHBORHOOD CONVENIENCE COMMERCIAL USES IN APPROPRIATE AREAS IN NEW NEIGHBORHOODS AND WITH APPROPRIATE OPERATING MEASURES WITHIN EXISTING NEIGHBORHOODS.

Development Guideline

10.10 - DG1 Maintain provisions in the Land Use Code for neighborhood commercial developments such as convenience grocery stores, including standards and limitations governing permitted uses, hours of operation and that mitigate potential adverse impacts such as traffic, safety, noise, litter, glare and loss of privacy to adjacent residential uses.

10.10 – DG2 Maintain and improve design review procedures to assure that proposals for neighborhood commercial development are evaluated with regard to site design, building placement, parking, landscaping, exterior lighting, and other factors related to surrounding properties, land uses and public facilities. Secure, dry bicycle racks or storage facilities should be provided at these sites.

Resource-Based Industrial Development

In addition to government and tourism, the area's natural resources, predominantly in the forms of minerals and seafood, are also important local economic resources. It is important to promote the long-term economic benefits

of developing these resources while mitigating any negative impacts of such development on the natural a environment. Mineral extraction is not a sustainable resource activity; once it is harvested, extracted or depleted, it cannot be renewed. However, abandoned mines and gravel pits can be of recreational or habitat value if properly remediated prior to re-use. When extracting mineral resources, care should be taken to avoid damage to nearby or downstream recreational, scenic, or fish and wildlife habitat that is vital to other basic industries, such as tourism or fisheries.

Commercial fisheries depend upon careful management of land and maritime resources, particularly the quality of headwaters, upland spawning and rearing habitats, associated watersheds and wetlands, and conveyance water bodies linking upland habitat to the sea. The protection of these resources and the provision of associated maritime support businesses and facilities, such as docks, harbors, vessel and gear repair facilities, marine gear sales and supply outlets, and seafood processing and shipping facilities is essential to sustain the commercial fishing industry.

POLICY 10.11. TO FACILITATE THE CAREFUL DEVELOPMENT OF ECONOMICALLY-VALUABLE NATURAL RESOURCES WHILE AVOIDING, MINIMIZING, AND/OR MITIGATING ADVERSE ENVIRONMENTAL AND/OR ECONOMIC IMPACTS TO OTHER LOCAL OR REGIONAL BUSINESS SECTORS.

Standard Operating Procedures

10.11 - SOP1 Work with state and federal agencies to promote natural resource development that is compatible with the policies contained in this Plan.

10.11 - SOP2 Maintain close coordination in the review process for state permit activities that affect land and habitat within the borough boundaries.

Development Guideline

10.11 - DG1 When reviewing permits for resource extraction and harvesting activities, identify and seek to mitigate off-site impacts that may affect fish and wildlife habitat or air and water quality necessary to sustain other economic sectors or subsistence activities in the community.

Implementing Actions

10.11 - IA1 Formulate management plans for resource-related activities such as sand and gravel extraction, mining and timber harvesting on CBJ-owned lands. These plans should include measures to avoid or mitigate off-site impacts to adjacent and downstream neighborhoods and habitat and should include plans for remediation and reuse of the land after depletion of the resource.

10.11 - IA2 Review Land Use Code provisions regarding timber harvesting. Consider exerting jurisdiction over logging areas larger than 10 acres, adopting regulations to guide timber harvesting, and clarifying the Code to distinguish between land clearing and timber harvest and to establish when logging operations require land use permits.

10.11 - IA3 Review Land Use Code provisions regarding home-based, small-scale and medium-scale agriculture and harvesting of flora. Encourage such activities to use careful soil and water management practices, non-invasive and non-synthetic fertilizers and pesticides to assure sustainability over the long-term. [see also 10.7 - IA3]

10.11 - IA4 Encourage the use of CBJ-owned land for sustainable harvesting of natural products to develop value-added products in cottage industries.

Waterfront Commercial and Industrial Development

Because of the community's dependence upon waterborne transportation and commerce, careful development of waterfront areas for commercial/industrial uses is critical to the area's continued economic vitality. Adequate docks and harbors are imperative for the community's future economic health. This subject is discussed more specifically in the discussion of the Seafood and Commercial Fishing Industry in the "Port Facilities" sections of Chapters 5 and 8 of this Plan. The CBJ government should identify and reserve waterfront areas that are appropriate for such facilities based on their physical suitability and access to transportation modes on land and water. The

CBJ government should also undertake measures to protect important shoreline fish and wildlife h sensitive coastal resources.

At least as important as waterfront facilities is the maintenance and protection of the waterway serving those facilities. Juneau is fortunate to have several protected port and harbor areas, but obstacles to maritime travel also exist and must be acknowledged. Although it is considered a navigable waterway by the federal government, the CBJ government does not consider Gastineau Channel navigable within the boundaries of the Mendenhall Wetlands State Game Refuge, as this portion of the channel is only navigable at high tides for a short period of time, and even then it is impassible for large vessels. The federal classification of this waterway as navigable requires the protection of an above-water area free and clear of obstructions that is equal to the unobstructed area under the Juneau-Douglas Bridge, which makes the design and construction of a North Douglas Crossing much more difficult and expensive than it would be if this channel were not so designated.

POLICY 10.12. TO DESIGNATE AND RESERVE WATERFRONT LAND WITH ADEQUATE SERVICES AND IN APPROPRIATE LOCATIONS FOR WATER-DEPENDENT RECREATION, PUBLIC ACCESS AND COMMERCIAL/INDUSTRIAL ACTIVITIES WHILE PROTECTING IMPORTANT FISH AND WILDLIFE HABITAT AND OTHER COASTAL RESOURCES.

Standard Operating Procedures

10.12 - SOP1 As part of a careful planning analysis of the uses of shoreline areas, designate lands on the Comprehensive Plan Land Use Maps that are suitable for water-dependent uses such as new or expanded docks, harbors and port facilities, marine drayage facilities, cruise ship facilities, recreation and tourism boat facilities, marine fuel depots, fisheries gear and vessel repair facilities, ice plants, landing and loading facilities, marine gear sales and service outlets, and public access to the water and shoreline facilities. Designate these areas as Marine Commercial (MC) or Waterfront Commercial/Industrial (WCI) lands on the Land Use maps in this Plan, and as appropriate zones in the zoning maps, to prohibit non-water-dependent uses such as office or non-maritime-related commercial uses within those districts. Allow residences above water-dependent uses in MC-designated lands, and prohibit permanent residences other than caretaker units in WCI-designated lands. Assure public access to the shoreline and waters for passive and active recreation uses.

10.12 - SOP2 Within the Capital Improvement Program (CIP), identify special infrastructure needs for port and water-dependent development.

10.12 - SOP3 Maintain and improve design review procedures to assure that proposals for waterfront development are evaluated with regard to site design, building placement, protection of view corridors from the sea and to the sea, exterior lighting, public access, water quality, and other factors related to surrounding properties, land uses and public facilities.

Development Guideline

10.12 - DG1 Deep water ports and navigable waters are valued assets and are critical to the sustainability of our economy and the livability of Juneau. New development along the shoreline should ensure that deep water navigable lanes for barges, the Coast Guard, commercial fishing vessels, research vessels, and other marine vessels critical to the local economy are protected from encroachment from incompatible land uses or physical obstructions .

Implementing Action

10.12 – IA1 Work with the state and federal governments to remove the navigable waterway designation from that portion of Gastineau Channel that cannot reasonably be navigated.

10.12 – IA2 Work with other southeast Alaska communities to support regional economic development goals and to minimize unnecessary duplication of waterfront services and infrastructure where possible.

Mixed Use Development

Downtown Juneau is the government, employment, tourism, historical and cultural center of the community as well as a residential neighborhood and commercial area. A strong downtown commercial area is critical to Juneau's social and economic vitality. Downtown Juneau, however, has seen the historic mix of small retail and residential uses eroded and, in some cases, replaced by tourist-oriented and government office use. Downtown Juneau near the cruise ship docks has become heavily congested during the summer months with visitor-oriented retail uses. As the cruise ships leave port in the evening, there is little opportunity for passengers to support restaurants, arts or entertainment activities in downtown. During the summer tourist season, government workers leave downtown after work to escape congestion and downtown businesses are left to cater to low-wage seasonal workers and local young adults; these groups are not capable, by themselves, of sustaining a vibrant and diverse business community. At the end of the summer tourist season, many of the tourist-oriented businesses close shop and downtown seems deserted. Downtown is in need of a greater proportion of residential uses to support a 24-hour, year-round community. This can be achieved by encouraging and facilitating mixed uses. Introducing year-round cultural destinations, an arts and entertainment district, and housing above, behind, and next to shops would create a vibrant, year-round community. This community should be walkable, with transit, bikes and walking as the primary means of intra-city travel.

Mixed use development is also seen as an avenue to implement several Comprehensive Plan policies, notably those pertaining to compact development, energy efficiency/sustainability, efficient transit services, and affordable housing. Locations outside of the downtown core that are suitable for mixed use development include downtown Douglas, the village center of Auke Bay near the University, and areas in and around shopping malls and near major employment centers. It should be noted that in mixed use areas around the airport, owners should be required to notify prospective tenants and buyers of aircraft noise impacts.

POLICY 10.13. TO PROVIDE FOR AND ENCOURAGE MIXED USE DEVELOPMENT THAT INTEGRATES RESIDENTIAL, RETAIL AND OFFICE USE IN DOWNTOWN AREAS, SHOPPING CENTERS, ALONG TRANSIT CORRIDORS, AND IN OTHER SUITABLE AREAS.

Standard Operating Procedures

10.13 - SOP1 Maintain one or more categories on the Comprehensive Plan Land Use Maps and the Zoning Maps that allow high density residential and retail and office uses as mixed use developments. Provision of public transit services to mixed use developments would justify lower parking requirements, particularly for housing to be occupied by students, seasonal workers, the elderly and/or mobility-impaired persons.

10.13 - SOP2 Maintain and improve provisions in the Land Use Code that include performance standards covering building height, site coverage, landscaping, buffering from incompatible uses, access, signage, parking and other design standards in the Mixed Use zones. Maintain and improve design review procedures to assure that proposals for mixed use development are evaluated with regard to site design, building placement, parking, landscaping, exterior lighting, and other factors ensuring privacy and livability of the project residents as well as factors to ensure the project is compatible with, and a good neighbor to, surrounding properties, land uses, and public facilities.

Implementing Actions

10.13 - IA1 Rezone the land areas so designated in this Plan for appropriate mixed use designations.

10.13 - IA2 Establish development standards and design guidelines for new mixed use developments patterned on the Transit Oriented Development guidelines cited in Chapter 3 of this Plan.

10.13 - IA3 Conduct an area plan for the Auke Bay community to create an attractive, pedestrian-oriented marine mixed use village that promotes affordable housing and accommodates the space and livability needs and objectives of residents, University students and faculty, recreational enthusiasts, fishermen and women, business operators, property owners, and area fish and wildlife.

10.13 - IA4 Conduct an area plan for downtown Douglas to protect and guide the redevelopm attractive, pedestrian-oriented marine and mixed use town that promotes affordable housing and accommodates the space and livability needs and objectives of residents, recreational enthusiasts, fishermen and women, business operators, property owners, and area fish and wildlife.

Public Uses

POLICY 10.14. TO RESERVE SUFFICIENT LANDS TO SUPPORT THE DEVELOPMENT OF PUBLIC FACILITIES THAT ARE ANTICIPATED TO BE NEEDED BY THE COMMUNITY IN THE FORESEEABLE FUTURE, INCLUDING RIGHTS-OF-WAY, SCHOOL SITES, PARKS, STREAM CORRIDORS, AND OTHER PUBLIC FACILITIES.

Standard Operating Procedure

10.14 – SOP1 Review potential land acquisitions and their proposed use for consistency with the Comprehensive Plan, and only seek acquisition of those properties that can be developed as desired in a manner that is consistent with the Comprehensive Plan. This SOP is not to be interpreted to preclude acquisitions that are achieved through tax foreclosure, donation, or other such unanticipated means; only those acquisitions that are actively sought by the CBJ should be reviewed for consistency with the Comprehensive Plan.

Implementing Action

10.14 - IA1 Amend the Land Use Code to create new overlay zoning districts for development bonus eligibility, such as Transit-Oriented Development (TOD) or Affordable Housing (AHOD), and for parks and stream corridors, view corridors (View Corridor Protection Overlay District), and for Noise Notification Overlay Districts; map those districts on the appropriate properties.

POLICY 10.15. TO RESERVE SUFFICIENT LANDS AND FACILITIES TO SUPPORT THE STATE CAPITAL FUNCTIONS IN DOWNTOWN JUNEAU, INCLUDING THE PROVISION OF ADEQUATE TRANSPORTATION, HOUSING, COMMERCE, COMMUNICATIONS SERVICES, CULTURAL AND ENTERTAINMENT ACTIVITIES AND OTHER SUPPORT SERVICES.

Standard Operating Procedure

10.15 - SOP1 Identify land areas on the Comprehensive Plan Land Use Maps for a Capitol Complex in downtown Juneau that would include adequate land to accommodate a Capitol building and associated office space, meeting rooms, presentation halls, transit services, parking facilities, telecommunications systems and facilities for remote testimony, media services, housing, commerce, entertainment, cultural activities, and dining services.

Implementing Action

10.15 - IA1 Acquire or dispose of properties in the downtown area as appropriate to facilitate the development of uses, public and private, that further the goals for the downtown area adopted in this Comprehensive Plan.

CHAPTER 11
LAND USE MAPS

The Comprehensive Plan Land Use Maps, generally called the "Comprehensive Plan Maps" or "Land Use Designation Maps", display land use designations for various subareas of the borough. The Comprehensive Plan Maps render the policies of the preceding chapters into specific land use designations for residential, commercial, industrial, natural areas, resource protection and institutional/public uses.

The land uses shown are expressed in a range of development intensities. In some cases, the Comprehensive Plan Map will provide a range of densities that can be allowed, which means that the corresponding zoning classification could be one of several selections within that range. For example, an "Urban Low Density Residential" (ULDR) Comprehensive Plan Land Use designation describes residential development with densities ranging from one to six dwelling units per acre. At the time of the drafting of this update, there are four Land Use Code residential zoning district designations that fall within this density range, and which could be chosen as consistent with the Comprehensive Plan.

In considering re-zoning requests, the Planning Commission and Assembly should aim to promote the highest and best use of the land under consideration and all new zoning or re-zoning designations are required to be substantially consistent with the Comprehensive Plan and associated land use maps. In some cases, the highest and best use may be increased density or more intensive use of the land; in other cases, the highest and best use may be preservation in an undisturbed state for purposes of habitat preservation, flood control, or providing a buffer between development and areas subject to natural hazards.

Encompassing over 3,000 square miles, the CBJ is difficult to depict unless its components are broken down into more easily mapped and displayed units. Thus, a study area was drawn from within the borough. The study area was in turn divided into subareas. The primary presentation of land use and related policies appear in Chapters 4 (Housing), 5 (Economic Development) and the Subarea Maps and related Guidelines described later in this Chapter.

Methodology and Criteria

The Comprehensive Plan Maps were prepared after analyzing each subarea in terms of its relationship to the existing community form, adopted policies, existing natural resources, habitat value, development patterns, suitability for additional development, and other characteristics. The steps taken to prepare the subarea maps are discussed below.

Vacant and potentially buildable land was located in each subarea and physical development constraints such as steep slopes and wetlands were evaluated. Road access, intersection capacity, utilities, adjacent land uses and existing development patterns were also analyzed. In most cases, existing patterns were reinforced with a compatible designation on the subarea maps. Most publicly-owned land within sensitive areas was designated for very low density development or resource conservation in accordance with the Natural Resource and Hazards policies described in Chapter 7 of this Plan. Designation of residential land was based on the level of existing or planned urban services, the pattern of existing subdivision(s), and compatibility with adjacent land uses.

For each subarea, the designated intensity of future development was determined in large part by whether the subarea is located in the Urban Service Area, rural areas, or New Growth Areas. For example, a key determinant for the use of land in the downtown Juneau and downtown Douglas areas are their characteristically urban form. The Lemon Creek, Switzer Creek, and East Mendenhall Valley areas are, overall, characteristically suburban in scale, form and density, although there are areas of high density apartments and manufactured home parks therein. Small areas around the University and Auke Bay share urban form and densities. The area west of the Mender

River, however, is rural in character although it is provided sewer service that, typically, warrants a suburban density of development. Likewise, North Douglas is in the process of being provided sewer service that warrants denser residential development. Areas that are planned for sewer service are designated so as to allow appropriate re-zoning to higher residential densities when services and road improvements are provided. The more remote roaded areas of Thane and Out the Road are rural and are not proposed for municipal water or sewer service within the 20 year planning horizon of this Plan.

Commercial uses were generally designated in or adjacent to existing commercial areas if the latter are accessible to major population centers. Water-dependent commercial uses were designated for shoreline areas characterized by adequate services and marine access. Mixed use or "Traditional Town Center" style development was designated in areas near existing shopping areas, along transit corridors, in downtown Juneau and Douglas and the village center of Auke Bay, based on existing development patterns, access and location.

Industrial districts were designated according to the type of industrial use therein or based on the location criteria of industrial businesses. Due to the incremental, yet significant, encroachment of commercial retail, office and service uses into industrially-zoned districts in Lemon Creek and near the airport, these areas were re-designated from industrial use to light industrial use. Other lands that had previously been designated for future park use near the airport (an abandoned sand and gravel pit) and for resource development in Lemon Creek (an active gravel pit) were designated for Resource Development; these areas are expected to be available for development in the long-term.

Waterfront areas were designated for water-dependent development, mixed with compatible commercial and residential uses, provided that public access to the water and valued view corridors are preserved.

The public/institutional designations reflect existing uses. In downtown Juneau they allow for expansion and redesign of municipal facilities and the State Capitol Complex. Public shoreline access is considered to be an important land use. The Comprehensive Plan Maps indicate existing public shoreline access points. The locations of potential small boat harbors are shown, as are potential roadway corridors.

Descriptions of Land Use Categories

The following descriptions should guide the development of Land Use Code zoning district permissible land uses, development standards and guidelines. These descriptions are intended to describe the overall character of development for each land use category and are not intended to be firm or restrictive definitions, such as with zoning district permitted and conditional uses. The Community Development Department (CDD), Planning Commission and the Assembly will use these descriptions of the character of the land use categories and zones to guide their formation of the zoning regulations for each. These land use categories and their uses reflect cultural values and economic and societal needs and, over time, the Comprehensive Plan descriptions of land use categories will change to reflect changing values and circumstances. Rezoning requests should be considered carefully by the CDD, Planning Commission, and Assembly in light of the existing character of the neighborhood, the community's vision for the area as it is described by the land use categories shown on the Comprehensive Plan Land Use Maps, and the particular dimensional standards and uses permitted in the adopted zoning designations available for use at that time.

Conservation Area (CA).

Conservation Areas consist of CBJ-owned Parks and Recreation Department-managed lands with recognized high value environmental qualities that are set aside for the protection and management of the natural environment with recreation, such as fishing, hiking and non-motorized boating, as a secondary objective. These may be non-anadromous fish watercourses or areas adjacent to anadromous fish streams that have been designated Stream Protection Corridors (SC), greenbelts, or high value wetlands. No development should be permitted other than structures, roads and trails necessary for the maintenance and protection of the resources or for managed public access for education and passive recreation purposes. These lands should be zoned to prevent residential, commercial, and industrial development, as well as resource extraction activities.

Stream Protection Corridor (SC).

On CBJ-owned lands, a SC-Stream Protection Corridor designation serves to protect anadromous fish streams and their tributaries from development that could cause pollution, erosion, depletion of groundwater infiltration or otherwise could degrade the stream corridor and its biological functions. Upon first designation, a 200 foot wide corridor on both sides of the bank would be included within the designated corridor along anadromous fish water bodies included within the Alaska Department of Fish and Game Inventory adopted by the CBJ Assembly. However, this "base" designation should be revised and the length and breadth of the specific corridor should be determined by a scientific/biological assessment of the functionality and habitat value of the particular stream segment; the width and length of the protected corridor may be more or less than the 200-foot base protection zone. No development should be permitted other than passive, non-motorized trails, their support systems and, under special circumstances, roads and parking areas necessary for the maintenance and protection of the resources therein or to facilitate managed non-motorized public access for education and passive recreation activities. These lands should be zoned to prevent residential, commercial, and industrial development, as well as resource extraction activities. The CBJ should retain ownership of these lands.

On publicly-owned lands that are not owned by the CBJ, a SC-Stream Protection Corridor designation is fixed at 200 feet from the ordinary high water mark of the shorelines of the anadromous fish creeks, streams, and lakes listed in the most recently CBJ-adopted Alaska Department of Fish and Game (ADF&G) inventory of anadromous fish streams.

Natural Area Park (NP).

Natural Area Parks are CBJ-owned lands characterized by areas of natural quality designed to serve the entire community by providing fish and wildlife habitat, open space/natural areas, access to water, and opportunities for passive and dispersed recreation activities. No development should be permitted other than structures, roads and trails necessary for the maintenance and protection of the resources or for managed public access for education and passive recreation purposes; this may include parking areas, educational kiosks, cabins, rest stations and similar convenience services for the recreational enthusiast. These lands should be zoned to prevent residential, commercial, and industrial development, as well as resource extraction activities. The CBJ should retain ownership of these lands.

Recreational Service Park (RS).

Recreation Service Parks include CBJ-owned lands with parks developed for active recreation, programmed use, and/or community gardens. Recreation, parking, playgrounds and fields, ski lifts, All-Terrain Vehicle (ATV) riding parks, rifle ranges, operations and maintenance-related structures are possible uses or components of RS-designated lands. These lands should be zoned to prevent residential, commercial, and industrial development, as well as resource extraction activities beyond those accessory to park development. The CBJ should retain ownership of these lands.

As many of the existing RS-designated lands are smaller than the minimum area required for a unique zone, these lands must be within the zoning district that surrounds or abuts them.

Federal Park (FP).

Federal Parks are public lands owned by federal agencies and managed for recreational use.

State Park (SP).

State Parks are public lands owned by state agencies and managed for recreational use.

Recreational Resource (REC).

Land primarily under federal or state management for a range of resources, such as timber, minerals, fish and wildlife and recreation uses, including recreation cabins. Uses may include small-scale, visitor-oriented, and/or seasonal recreational facilities. These lands should be zoned to prevent residential, commercial, and industrial development.

Watershed (WS).

Watershed lands are in natural, largely undisturbed states that provide, or could in the future provide, water supplies for domestic water consumption. Any development within WS-designated lands should be designed and/or use Best Management Practices to avoid negative impacts to water quality. Watersheds are overlay land use designations that transcend other land use designation boundaries.

Hazard Area (HA).

Hazard Area lands have characteristics that could pose hazards to the general public and, therefore, development therein should be prohibited or, if allowed, should be designed and operated in such a way as to ameliorate any adverse impacts associated with the identified hazard. Examples of hazardous lands include areas with moderate to high potential for avalanche or mass-wasting/landslide events. Lands within Hazard Area designations may be zoned for a mix of zoning districts, most particularly the same district as the surrounding lands. CBJ-owned lands in hazard areas should be retained in CBJ ownership.

Hazard areas are overlay land use designations that transcend other land use designation boundaries. Although any zoning district could be overlaid by the HA land use designation, residential densities should be kept low in areas designated as within hazard areas in regulatory maps, unless substantial effort to protect residents is made in project design and construction. The Hazard Areas shown on the Comprehensive Plan Land Use Maps are general in nature; regulatory maps must be based on careful scientific review of site-specific conditions, and will be more specific.

Scenic Corridor/Viewshed (SCV).

This designation is suitable for CBJ-owned and other public lands whose views of, or whose near and/or distant views from the locale, are deemed as spectacular and/or represent a significant and important representation of the visual character of the CBJ. The views of, or from, the designated SCV land area toward public vista points or viewscapes:

1. demonstrate a scenic view of great natural beauty, a spectacular landscape, an important historic building or site;

2. provide views of the aurora borealis, sea, harbors, or of a cityscape that is a “signature” viewscape of the CBJ; and,

3. is valued by residents and visitors alike and conveys the Juneau area as a special place.

Lands within the scenic corridor or viewscape should be protected from visual intrusion or obstructions from structures, night light and glare, invasive flora, and/or other similar elements that would diminish the visual prominence of the viewscape. Lands within SCV designations may be zoned for a mix of zoning districts, most particularly the same district as the surrounding lands; however, any new zoning request or rezoning application should identify specific view corridors that would be protected by any new development therein. Land uses that do not require view-blocking structures should be permitted, such as public vista plazas and seating areas, community gardens, boat launch facilities, fishing areas or utility poles.

Institutional and Public Use (IPU).

Lands that are in public ownership and dedicated for a variety of public uses, such as the University of Alaska Southeast; local, state and federal government uses; and for such public facilities as community gardens, schools, libraries, fire stations, treatment plants, and public sanitary landfills. Included are potential sites for future boat harbors, schools, parks, farmers markets, publicly-supported arts events, permitted arts or food-service kiosks or sales activities, parking facilities and road and public transit system easements. Also included are public aircraft facilities.

The public use of these lands will vary widely, so IPU-designated lands can be under any zoning district, with the uses thereon appropriate for that zone as regulated in the Table of Permissible Uses (CBJ 49.25.300); the zone of any particular public use should be the same district as the surrounding or abutting lands.

Resource Development (RD).

Land to be managed primarily to identify and conserve natural resources until specific land uses are identified and developed. The area outside the study area of this Comprehensive Plan is considered to be designated Resource Development. As resources are identified or extracted from these lands, they should be re-designated and re-zoned appropriately.

Rural Dispersed Residential (RDR).

These lands are characterized by dispersed, very low density development not provided with municipal sewer or water. Densities are intended to permit one dwelling unit per acre or larger lot sizes, based on existing platting or the capability of the land to accommodate on-site septic systems and wells. Uses may also include small-scale, visitor-oriented, seasonal recreational facilities.

Rural/Low Density Residential (RLDR).

Rural residential land at densities of one to three dwelling units per acre, based on existing platting and capability of the land to accommodate on-site septic systems and wells or whether the land is served by municipal water and sewer service.

Urban/Low Density Residential (ULDR).

These lands are characterized by urban or suburban residential lands with detached single-family units, duplex, cottage or bungalow housing, zero-lot-line dwelling units and manufactured homes on permanent foundations at densities of one to six units per acre. Any commercial development should be of a scale consistent with a single-family residential neighborhood, as regulated in the Table of Permissible Uses (CBJ 49.25.300).

Medium Density Residential (MDR).

These lands are characterized by urban residential lands for multifamily dwelling units at densities ranging from 5 to 20 units per acre. Any commercial development should be of a scale consistent with a residential neighborhood, as regulated in the Table of Permissible Uses (CBJ 49.25.300).

Medium Density Residential—Single Family Detached (MDR/SF).

These lands are characterized by single-family detached homes at densities ranging from 10 to 20 units per acre. Only single-family detached homes, single-family detached homes with an accessory apartment, cottage houses and bungalow houses are permitted within this zone. Any commercial development should be of a scale consistent with a single-family residential neighborhood, as regulated in the Table of Permissible Uses (CBJ 49.25.300).

High Density Residential (HDR).

These lands are characterized by urban residential lands suitable for new, in-fill or redevelopment housing at high densities ranging from 18 to 60 units per acre. Commercial space may be an element of developments on properties under this designation, as regulated in the Table of Permissible Uses (CBJ 49.25.300).

Traditional Town Center (TTC).

These lands are characterized by high density residential and non-residential land uses in downtown areas and around shopping centers, the University, major employment centers and public transit corridors, as well as other areas suitable for a mixture of retail, office, general commercial, and high density residential uses at densities at 18 or more residential units per acre. Residential and non-residential uses could be combined within a single structure, including off-street parking. Ground floor retail space facing roads with parking behind the retail and housing above would be an appropriate and efficient use of the land.

Marine Mixed Use (M/MU).

These lands are characterized by high density residential and non-residential land uses in areas in and around harbors and other water-dependent recreational or commercial/industrial areas. Typically, neighborhood-serving and marine-related retail, marine industrial, personal service, food and beverage services, recreational services, transit and transportation services should be allowed and encouraged, as well as medium- and high-density residential uses at densities ranging from 10 to 60 residential units per acre. Ground floor retail space facing roads with parking behind the retail and housing above would be an appropriate and efficient use of the land. Float homes, live-a-boards, and house boats, if necessary services (such as sewer) are provided to berthing locations, are appropriate for these areas.

Bonus-Eligible Area (BE).

Bonus-Eligible areas are shown on the Bonus-Eligible Area Overlay District Map. Areas within the Bonus-Eligible Overlay District may be considered for inclusion in bonus-eligible overlay districts adopted into the zoning maps; such bonus-eligible overlay districts may be designed to achieve a particular purpose, such as the Affordable Housing Overlay District (AHOD) or a Transit Oriented Development Overlay District (TOD). Regardless of the name given to such an overlay district in the zoning map set, the intent of the BE designation is to encourage the development of relatively dense, mixed use, pedestrian-oriented land uses in close proximity to high levels of transit service. Particular details of how both the AHOD and TOD Overlay Districts are envisioned are included throughout this Plan, and with particularity in Chapters 4 (AHOD) and 3 (TOD). The goals, objectives, and bonuses that are relevant or applicable to either AHOD or TOD have a high degree of overlap, and a single bonus-eligible area and associated set of land use permitting requirements may suffice to meet the need for both overlays that are expressed in this Plan. The BE area is defined as that portion of the Urban Service Area that is, at the time of map adoption:

1. Within ½ mile distance of, and not separated by a water body from, a public transit route with regular service that is ½ hour or less on average;

2. Not within the Mendenhall Wetlands State Game Refuge;

3. Not within the Juneau International Airport; and,

4. Not within a Light Industrial (LI), Heavy Industrial (HI), or Waterfront Commercial/Industrial (WCI) land use designated-area on the Land Use Maps in this chapter.

Commercial (C).

Lands devoted to retail, office, food service or personal service uses, including neighborhood retail and community commercial centers, such as shopping centers and malls, office complexes or other large employment centers. Mixed retail/residential/office uses are allowed and encouraged. Residential and non-residential uses could be combined within a single structure, including off-street parking. Residential densities ranging from 18- to 60-units per acre are appropriate in this area, with even higher densities appropriate in mixed-use or transit-oriented developments. Ground floor retail space facing roads with parking behind the retail and housing above would be an appropriate and efficient use of the land.

Light Industrial (LI).

Land to be developed for heavy commercial or light industrial uses such as small- to medium- scale food processing; printing and other business services; wholesale trade; research and development laboratories; light manufacturing processes; metal fabrication; warehousing, trucking; animal kennels; crematoria; indoor and outdoor storage; car, boat, and heavy equipment sales; and repair and maintenance activities. Residential units should be limited to caretaker units where the occupant works directly for or owns the business for which the occupant is caretaking.

Heavy Industrial (HI).

Land to be developed for heavy industrial uses such as large scale food production and/or processing; large-scale or industrial-related repair activities; metal fabrication; wholesale trade; manufacturing processes; warehousing; outdoor storage; trucking; animal kennels; crematoria; repair and maintenance uses; resource extraction and processing such as gravel pits, rock crushing facilities, cement batch plants, asphalt plants, fuel tanks, stump dumps, salvage yards, landfill sites; aircraft facilities; and other similar large-scale or noisy and/or noxious industrial activities. Some recreational uses should be permitted, including sport vehicle, All Terrain Vehicle (ATV) or snowmobile motor-course facilities, shooting ranges, and other similar noise-generating uses. Residential, office, retail, and personal service uses are not to be allowed, except that residential caretaker facilities should be permitted.

Marine Commercial (MC).

Land to be used for water-dependent commercial uses such as marinas/boat harbors, marine vessel and equipment sales and repair services, convenience goods and services for commercial and sport fishing, marine recreation and marine tourism activities such as food and beverage services, toilet and bathing facilities, bait and ice shops, small-scale fish processing facilities, hotels and motels, and similar goods and services to support mariners and their guests. Float homes, house boats, and live-aboards would be residential uses to be allowed within an MC district,

Waterfront Commercial/Industrial (WCI).

Land to be used for water-dependent heavy commercial and industrial uses such as marine transportation terminals, large or small boat marinas, boat repair, shipyards, marine freight handling areas, fish buying and processing plants, ice plants, marine hatcheries, and marine parks. Residential uses would not be allowed in Waterfront Commercial/Industrial Districts, with the exception of caretaker units.

Subarea Maps and Subarea Guidelines and Considerations

The Subarea Maps section describes subarea land use on maps and with text. It lists the particular guidelines and considerations that should influence land use decisions for the Subareas. Resources and hazards are shown for each subarea and are intended to be informational. For each subarea there is also a discussion of factors that will influence the future direction of the subarea. Finally, guidelines for future subarea planning, including capital improvements and permit review considerations that emerged from the 2008 Comprehensive Plan update process are listed.

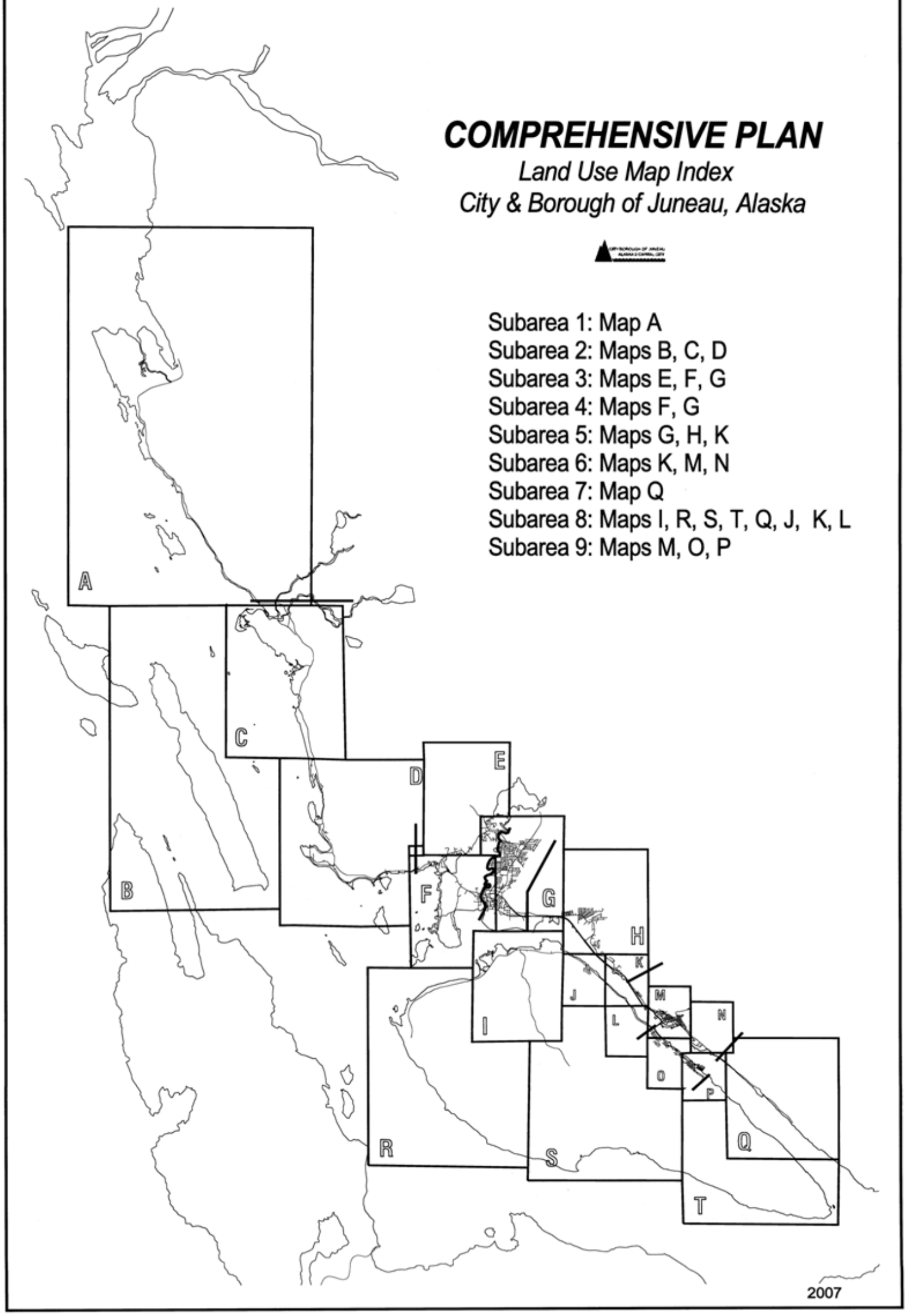
The nine subareas are shown on the Land Use Map Index.

COMPREHENSIVE PLAN

Land Use Map Index

City & Borough of Juneau, Alaska

Subarea 1: Map A
Subarea 2: Maps B, C, D
Subarea 3: Maps E, F, G
Subarea 4: Maps F, G
Subarea 5: Maps G, H, K
Subarea 6: Maps K, M, N
Subarea 7: Map Q
Subarea 8: Maps I, R, S, T, Q, J, K, L
Subarea 9: Maps M, O, P



Map 11.1

Map A

Subarea 1
Eagle River to Berners Bay

Subarea 2
Lena Cove to
Eagle River

Berners Bay
LYNN CANAL
Point Bridget State Park
Cedar Lake Trail
Point Bridget Trail
Eagle Cove
Davies Creek Trail
DAVIES CREEK
MAB ISLAND
Bridget Cove
GLACIER HIGHWAY
Cowee Creek Trail
COWEE CREEK
BRIDGET COVE CREEK
Bessie Creek Trail
BESSIE CREEK
Yankee Cove
BENJAMIN ISLAND
RALSTON ISLAND
Amalga Trail
EAGLE RIVER
Herbert Glacier Trail
Eagle Beach SP
Windfall Lake Trail
HERBERT RIVER

RD REC SP NP SC MC CA

NATURAL RESOURCE
- REC Recreational Resource
- RD Resource Development
- SP State Park
- NP CBJ Natural Area Park
- RS CBJ Recreational Service Park
- CA CBJ Conservation Area
- SC Stream Protection Corridor

COMMERCIAL INDUSTRIAL
- C Commercial
- MC Marine Commercial
- WCI Waterfront Commercial Industrial
- LI Light Industrial
- HI Heavy Industrial

7000 0 7000 Feet

RESIDENTIAL
- RDR Rural Dispersed Residential
- RLDR Rural Low Density Residential
- ULDR Urban Low Density Residential
- MDR/SF Medium Density Residential- Single Family
- MDR Medium Density Residential
- HDR High Density Residential
- TTC Traditional Town Center
- M/MU Marine Mixed Use

PUBLIC
- IPU Institutional and Public Use
- Existing School
- Potential School Location

ROADS TRAILS
- Potential Arterial (alignment not specific)
- Potential Road (alignment not specific)
- Trails

OTHER
- New Growth Areas
- Mendenhall Wetlands State Game Refuge
- Subarea Boundary
- Urban Service Area
- Beach Access
- Streams

City & Borough of Juneau
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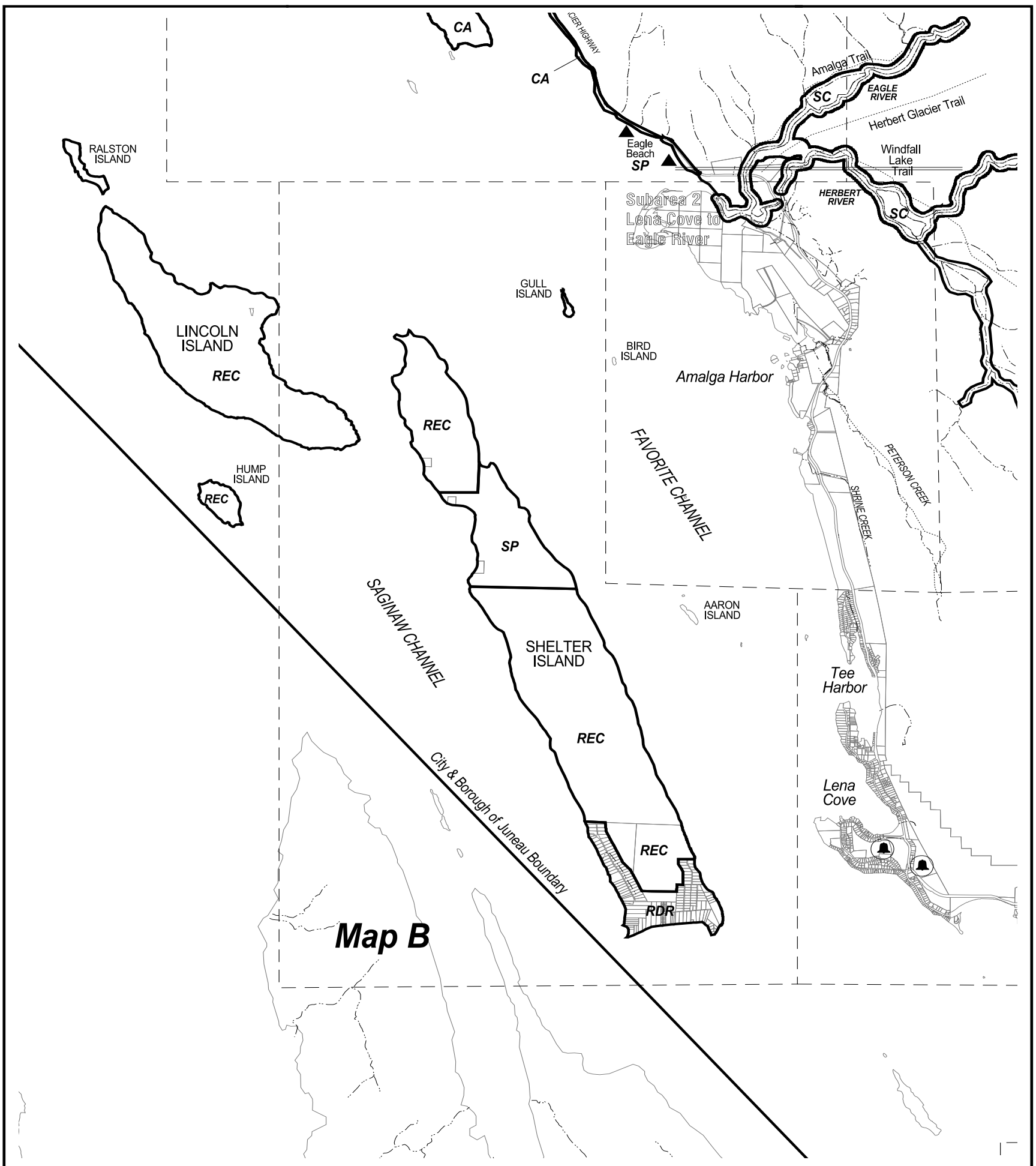
Prepared by: Community Development Department

Map 11.2



NATURAL RESOURCE

REC	Recreational Resource
RD	Resource Development
SP	State Park
NP	CBJ Natural Area Park
RS	CBJ Recreational Service Park
CA	CBJ Conservation Area
SC	Stream Protection Corridor

COMMERCIAL INDUSTRIAL

C	Commercial
MC	Marine Commercial
WCI	Waterfront Commercial Industrial
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7000 0 7000 Feet

RESIDENTIAL

RDR	Rural Dispersed Residential
RLDR	Rural Low Density Residential
ULDR	Urban Low Density Residential
MDR/SF	Medium Density Residential- Single Family
MDR	Medium Density Residential
HDR	High Density Residential
TTC	Traditional Town Center
M/MU	Marine Mixed Use

PUBLIC

IPU	Institutional and Public Use
	Existing School
	Potential School Location

ROADS TRAILS

	Potential Arterial (alignment not specific)
	Potential Road (alignment not specific)
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OTHER

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Prepared by: Community Development Department

Map 11.3

Map C

Subarea 1
Eagle River to Berners Bay

Subarea 2
Lena Cove to
Eagle River

EAGLE RIVER
Eagle Beach
Windfall Lake Trail
HERBERT RIVER
HERBERT RIVER RD
STRAWBERRY CREEK
GLACIER HWY
Eagle Harbor
Amalga Harbor
BIRD ISLAND
KISHBROCK ISLAND
Peterson Lake Trail
Pearl Harbor
Shrine of St. Therese
PETERSON CREEK
SHRINE CREEK
COHEN DR
AARON ISLAND

REC, SC, NP, RD, RDR, SP, IPU

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3000 0 3000 Feet

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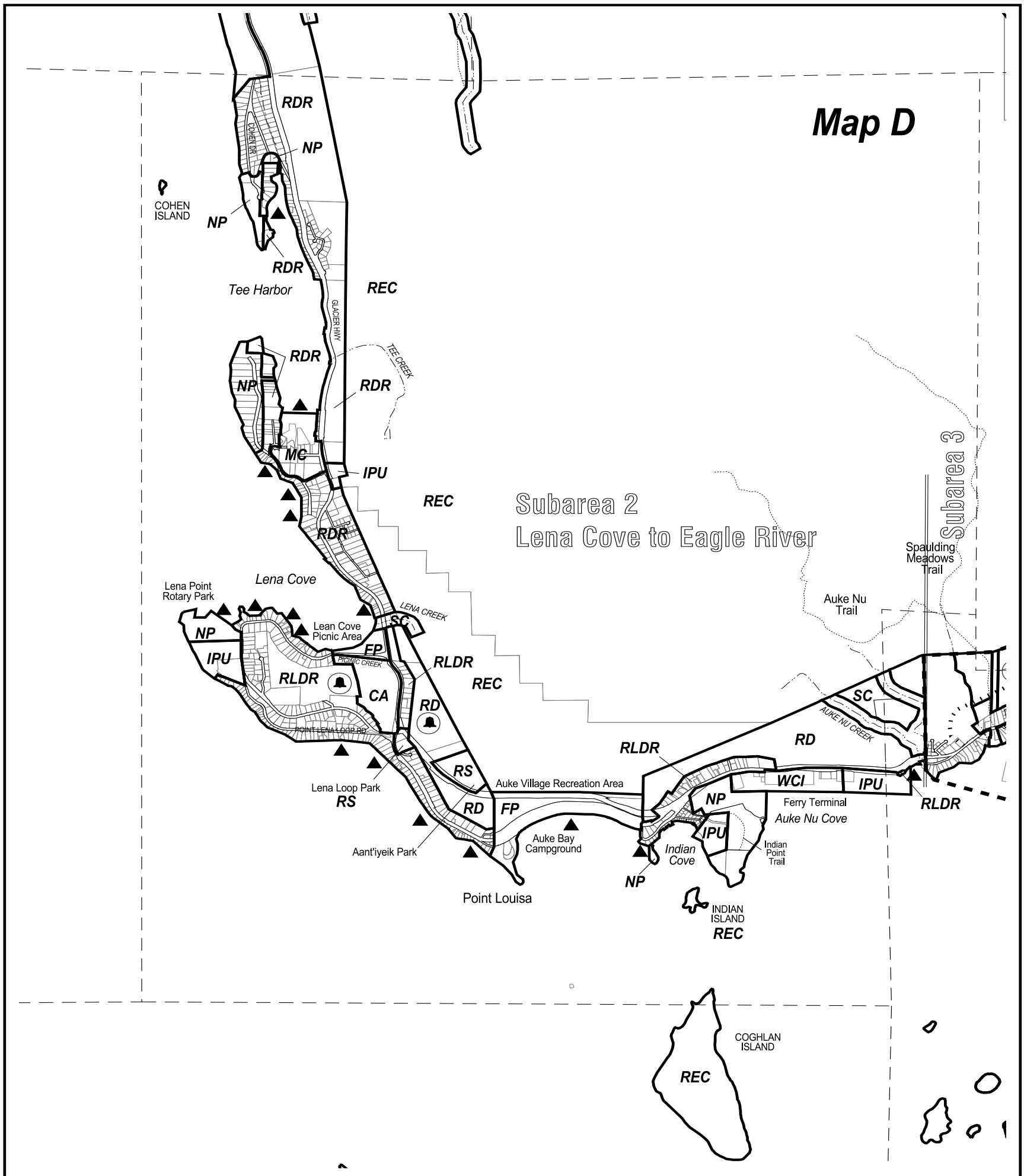
Map 11.4

Map D



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COMMERCIAL INDUSTRIAL
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3000 0 3000 Feet

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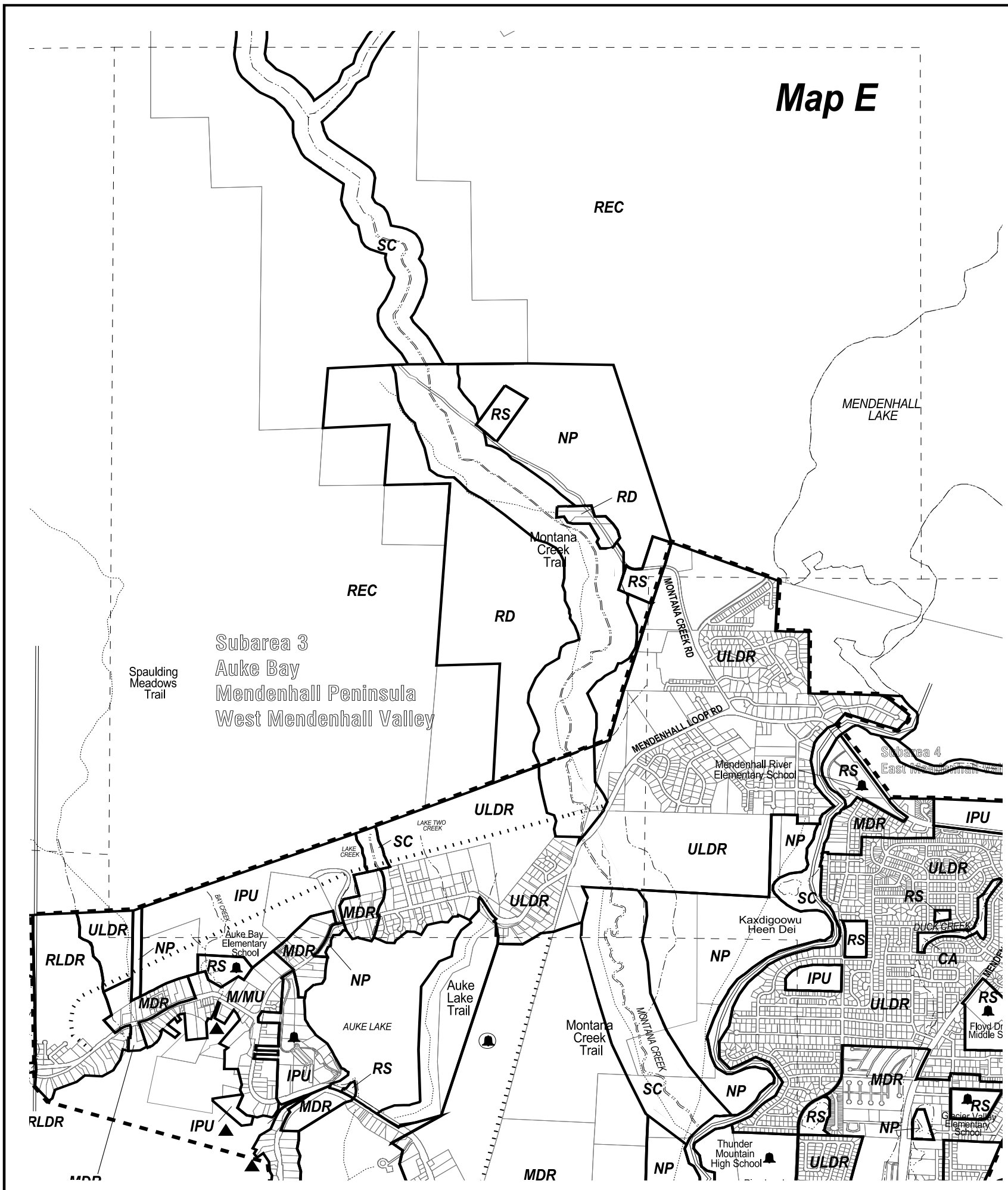
Prepared by: Community Development Department

Map 11.5

Map E



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2000 0 2000 Feet

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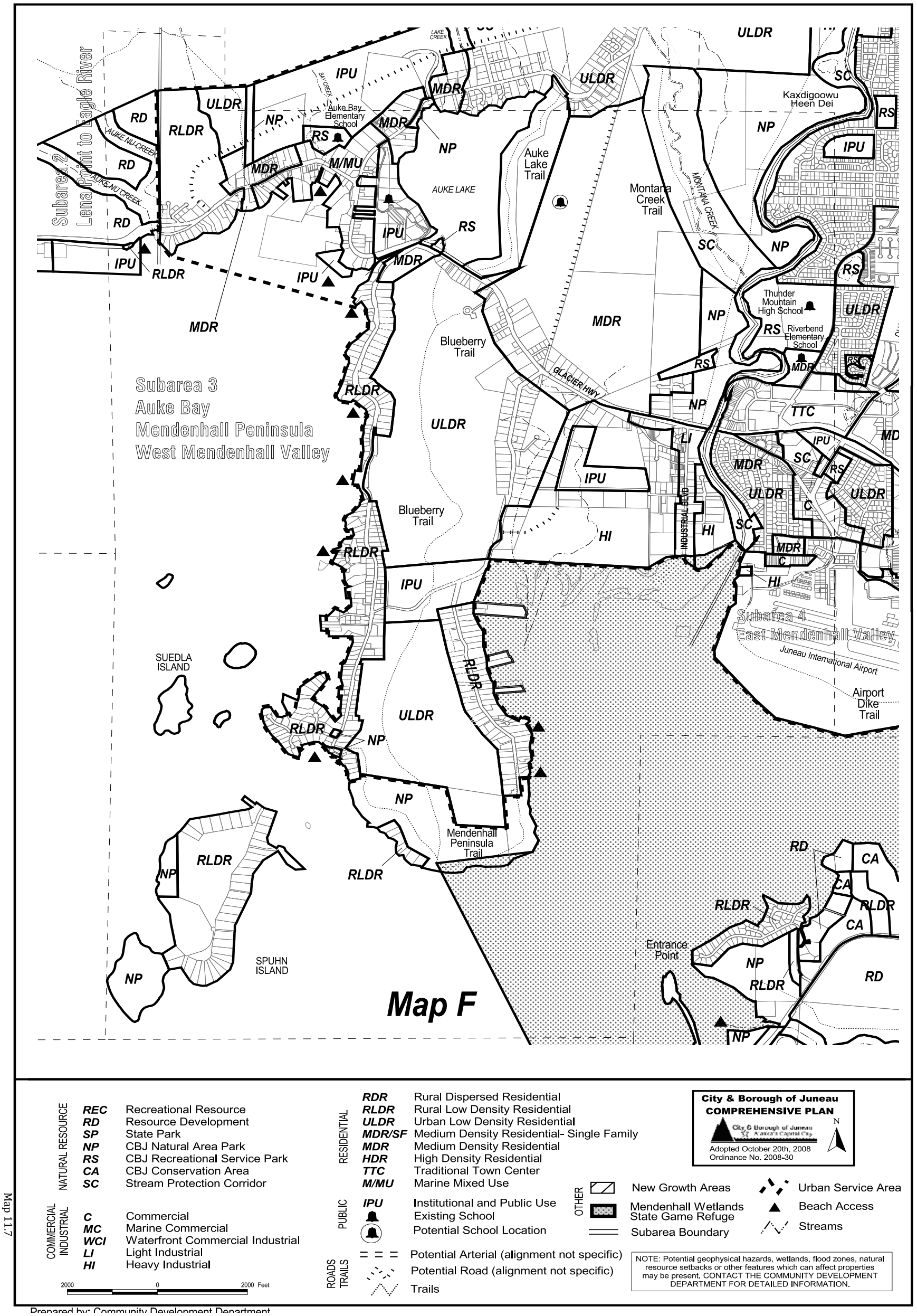
Map 11.6



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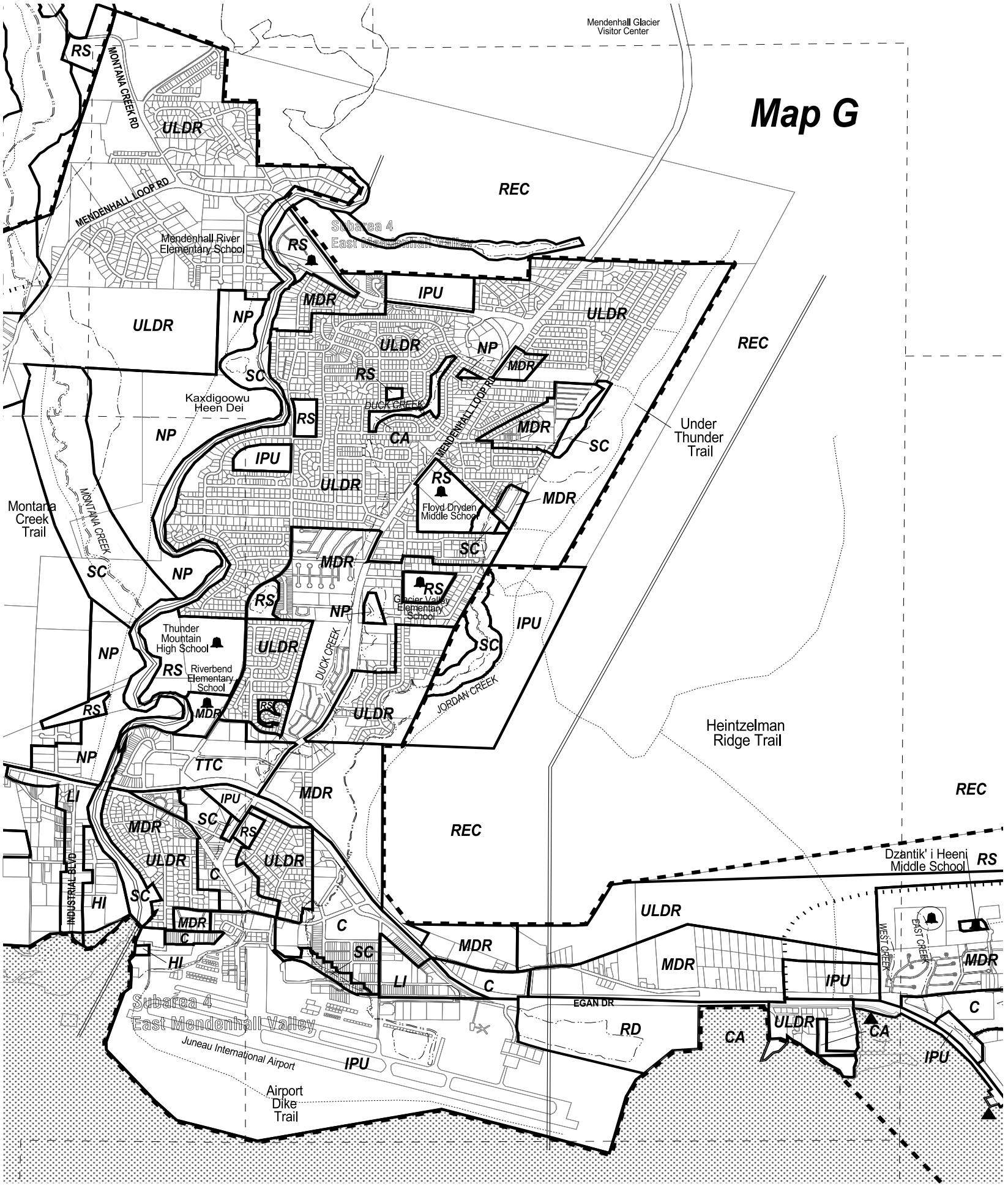
Map 11.7

Map G



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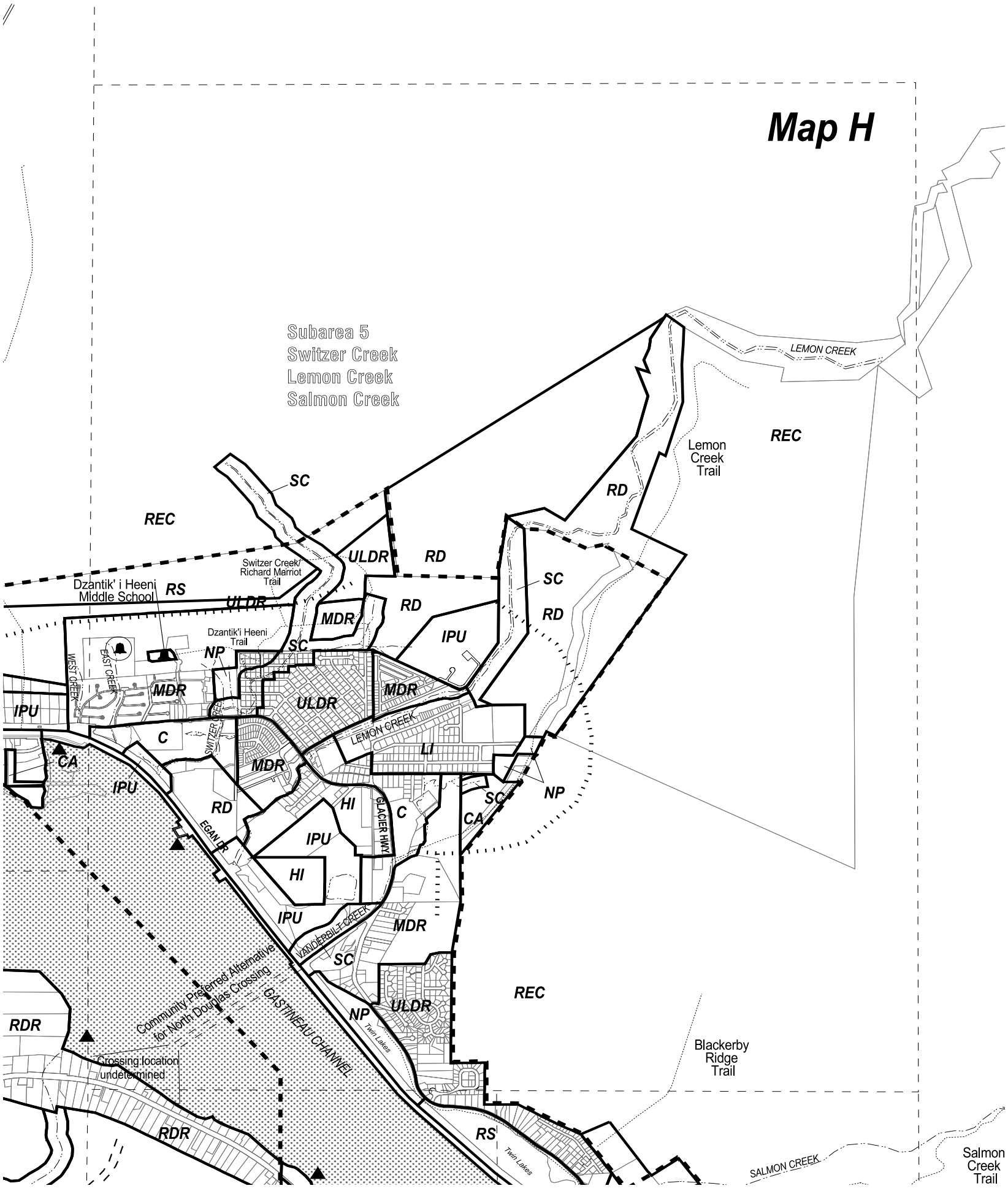
Map H

Subarea 5
Switzer Creek
Lemon Creek
Salmon Creek



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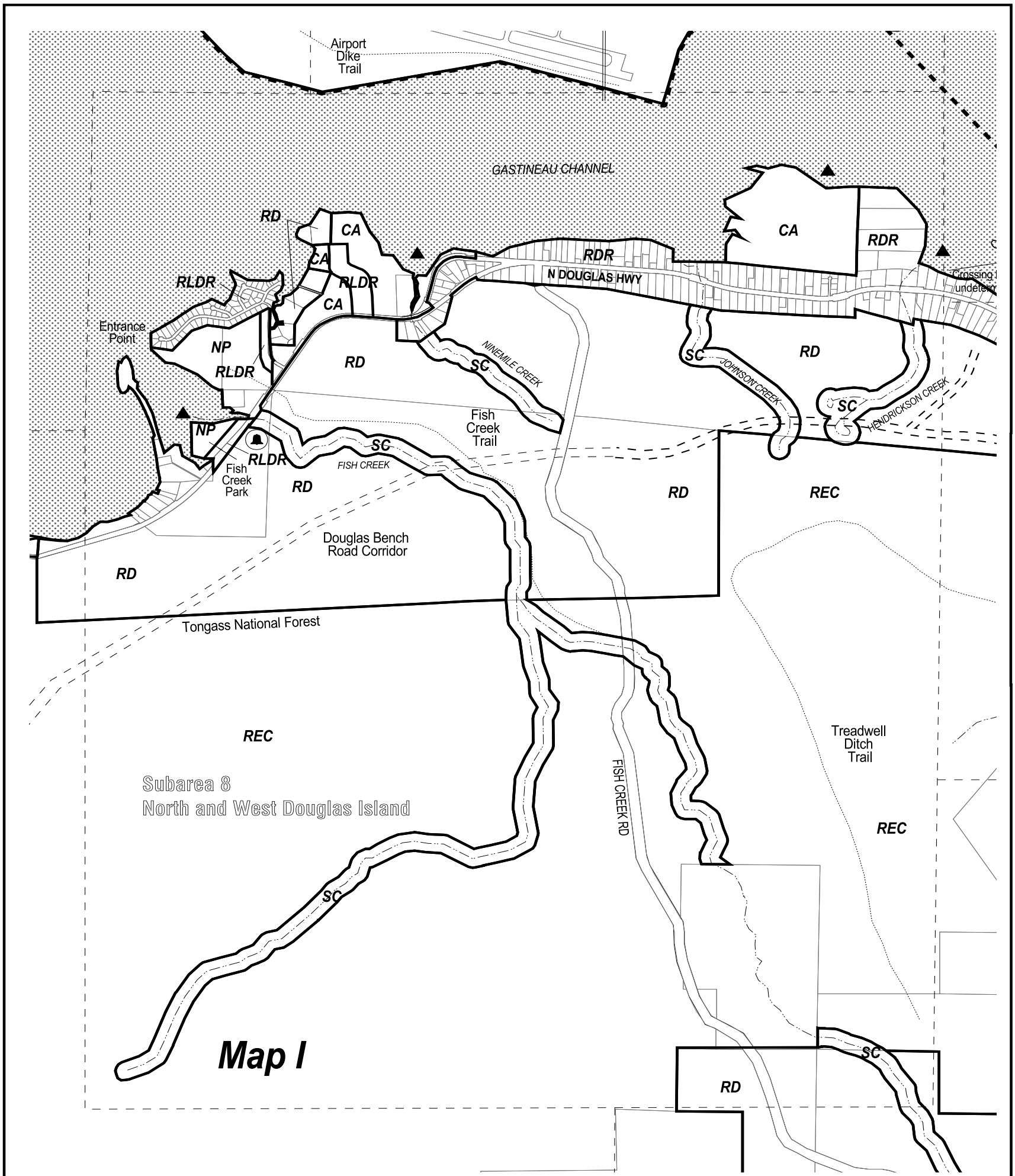

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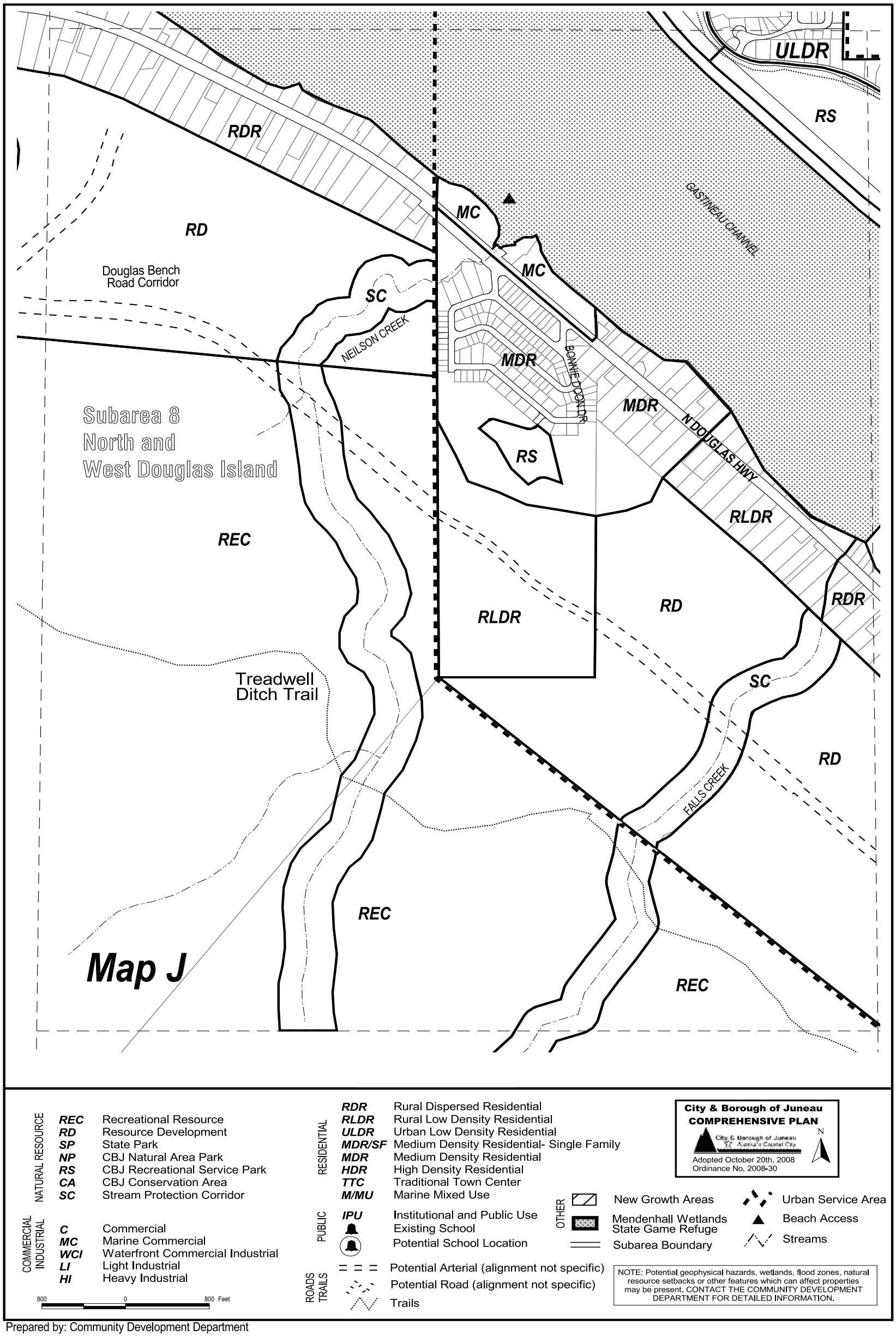
Map 11.10



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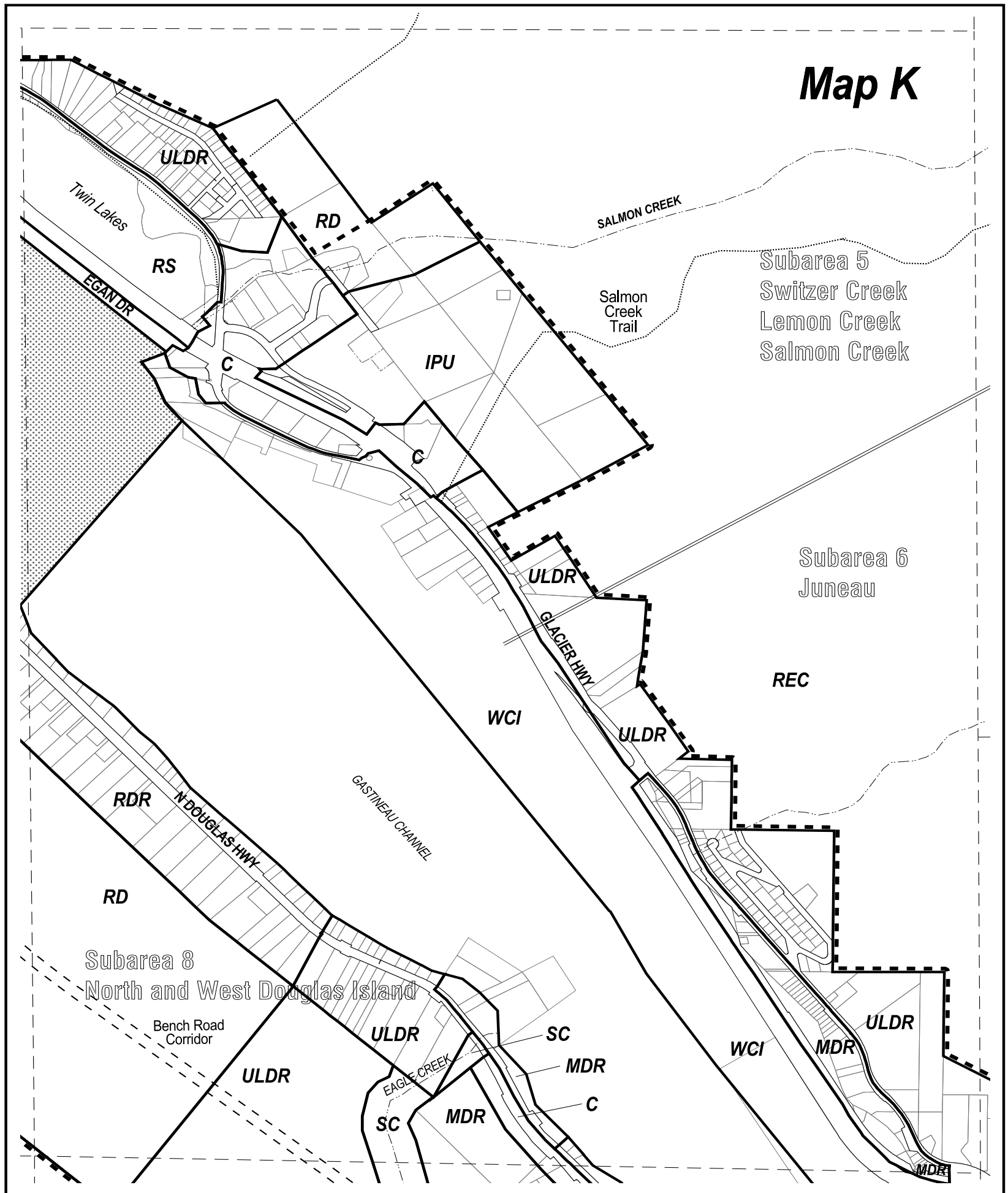
Map 11.11

Map K



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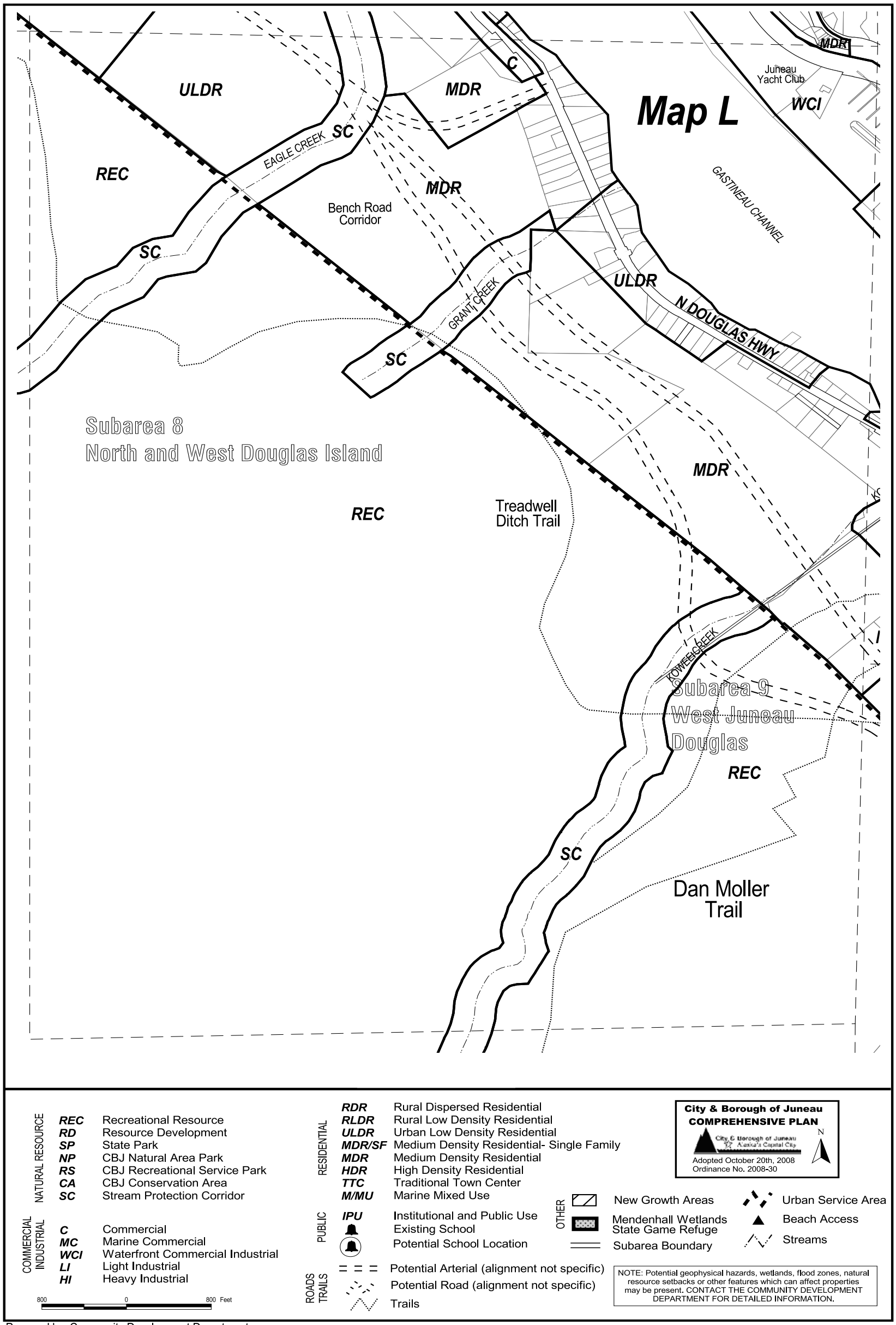
Map 11.12



Prepared by: Community Development Department

Map 11.13

Map M

Subarea 6
Juneau

Juneau Douglas High School
Montessori School
Harborview Elementary School
Yaakoosgé Daakahídi Alternative High School
Evergreen Cemetery
Cope Park
Juneau Community Charter School
Aurora Basin
Harris Harbor
Gold Creek Protection Zone
Juneau Douglas Bridge
KOWEE CREEK
EGAN DR
GLACIER HWY
WILLOUGHBY AVE
S FRANKLIN ST
GOLD CREEK
BASIN RD
DOUGLAS HWY

ULDR, WCI, MC, IPU, C, MDR, RD, RS, REC, MDR-SF, TTC

CAPITOL COMPLEX
★ ALASKA STATE CAPITOL
☆ FUTURE STATE CAPITOL SITE

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800 0 800 Feet

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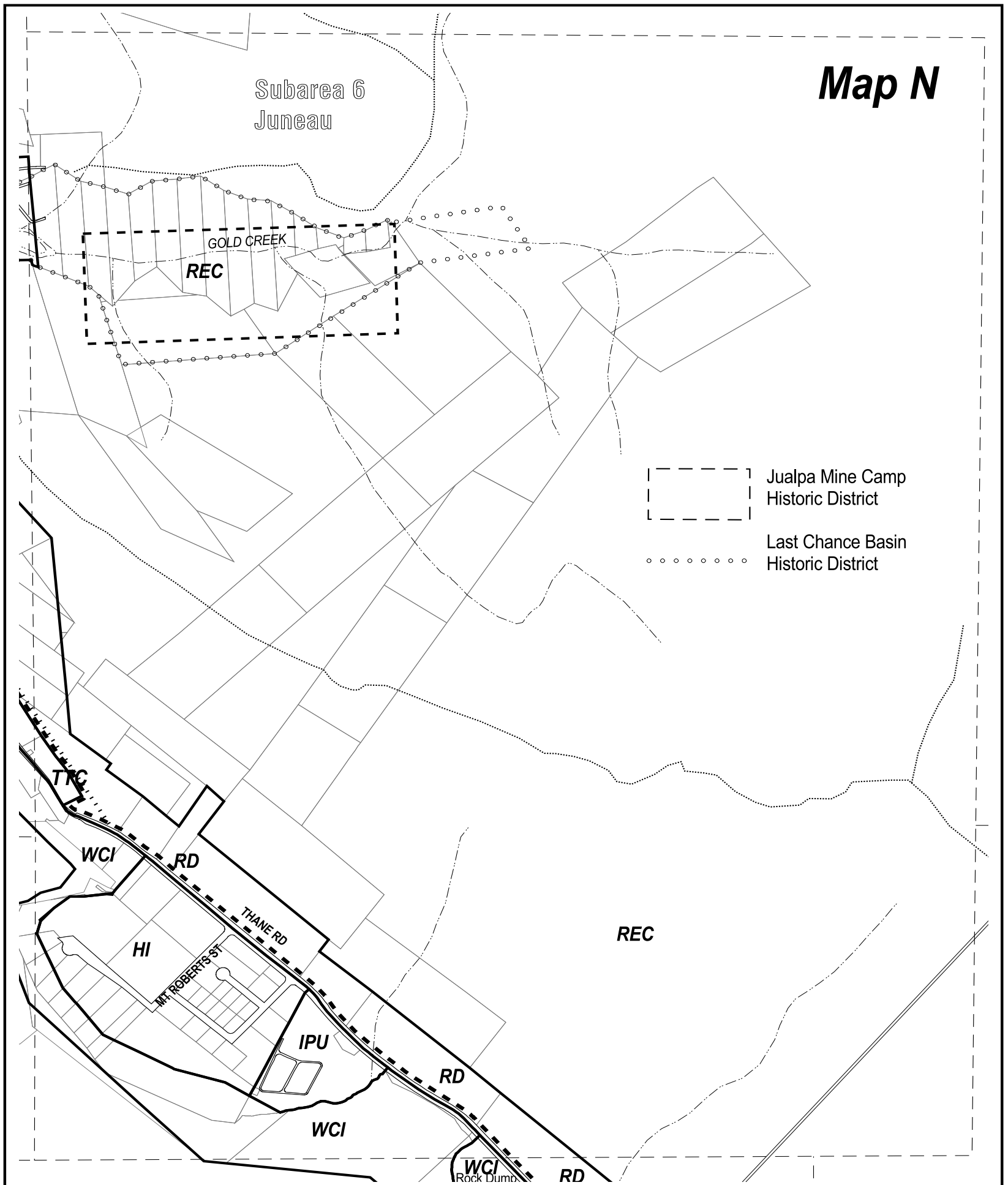
Prepared by: Community Development Department

Map 11.14

Map N



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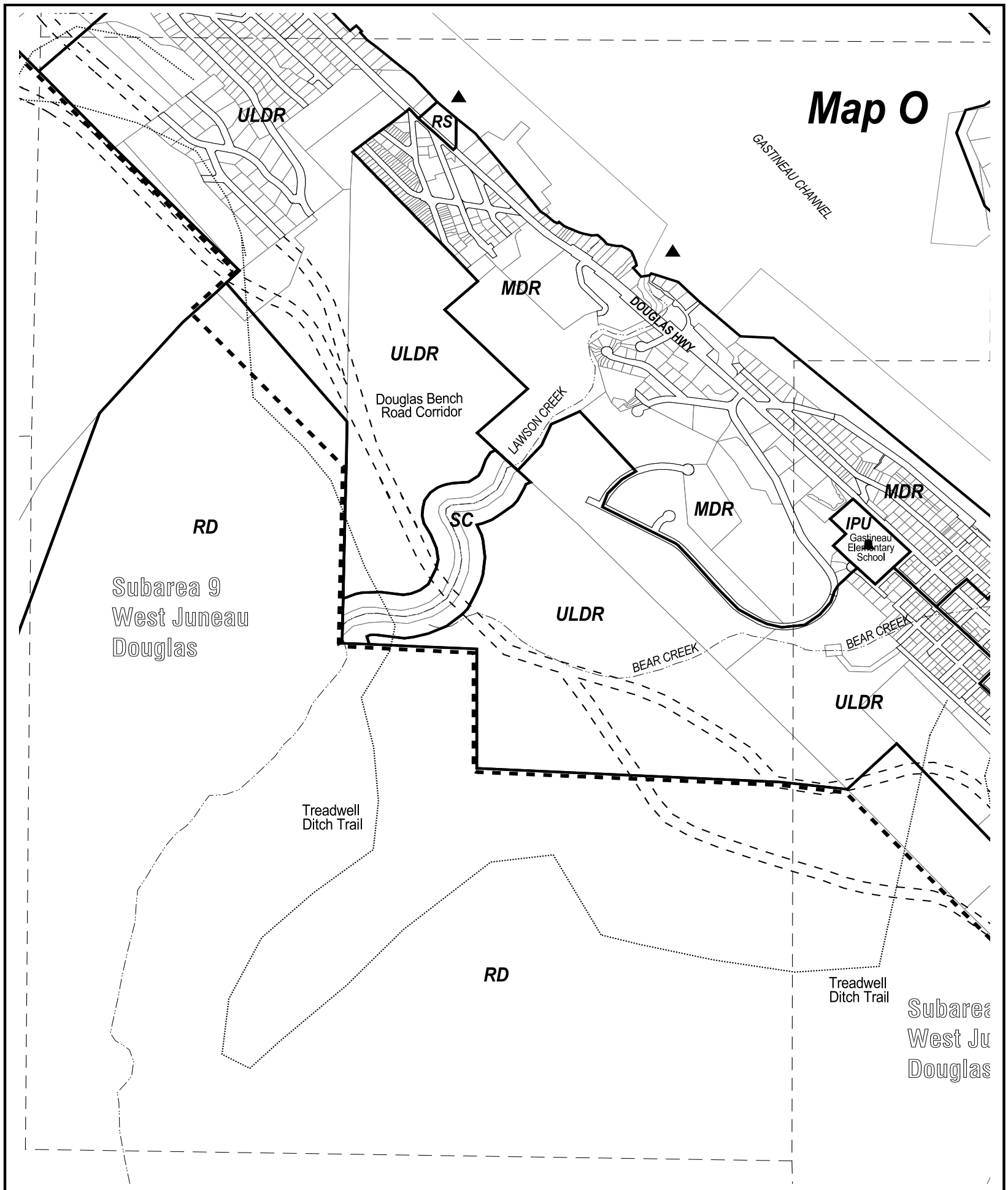
City & Borough of Juneau
COMPREHENSIVE PLAN
City & Borough of Juneau
The Capital City
N
Adopted October 20th, 2008
Ordinance No. 2008-30

NOTE: Potential geophysical hazards, wetlands, flood zones, natural resource setbacks or other features which can affect properties may be present. CONTACT THE COMMUNITY DEVELOPMENT DEPARTMENT FOR DETAILED INFORMATION.

Prepared by: Community Development Department

Map 11.15

Map O



NATURAL RESOURCE
- REC Recreational Resource
- RD Resource Development
- SP State Park
- NP CBJ Natural Area Park
- RS CBJ Recreational Service Park
- CA CBJ Conservation Area
- SC Stream Protection Corridor

COMMERCIAL INDUSTRIAL
- C Commercial
- MC Marine Commercial
- WCI Waterfront Commercial Industrial
- LI Light Industrial
- HI Heavy Industrial

800 0 800 Feet

RESIDENTIAL
- RDR Rural Dispersed Residential
- RLDR Rural Low Density Residential
- ULDR Urban Low Density Residential
- MDR/SF Medium Density Residential- Single Family
- MDR Medium Density Residential
- HDR High Density Residential
- TTC Traditional Town Center
- M/MU Marine Mixed Use

PUBLIC
- IPU Institutional and Public Use
- Existing School
- Potential School Location

ROADS TRAILS
- Potential Arterial (alignment not specific)
- Potential Road (alignment not specific)
- Trails

OTHER
- New Growth Areas
- Mendenhall Wetlands State Game Refuge
- Subarea Boundary
- Urban Service Area
- Beach Access
- Streams

City & Borough of Juneau
COMPREHENSIVE PLAN
City & Borough of Juneau Alaska's Capital City
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Prepared by: Community Development Department

Map P

WCI
WCI
Rock Dump
RD
Subarea 6
Juneau
WCI
RDR
Subarea 7
Thane
MDR
IPU
Gastineau
Elementary
School
GASTINEAU CHANNEL
BEAR CREEK
TTC
M/MU
MAYFLOWER
ISLAND
IPU
MC
ULDR
Montessori
School
IPU
Robert Savikko
Recreation Area
RS
Parcels changed from
NP to MDR per Ord. 2016-45,
adopted 1/9/2017
MDR
NP
NP
RD
ULDR
Treadwell
Ditch Trail
Subarea 9
West Juneau
Douglas
Douglas Bench
Road Corridor
RD
Subarea 8
North and West Douglas Island
RD
PARIS CREEK

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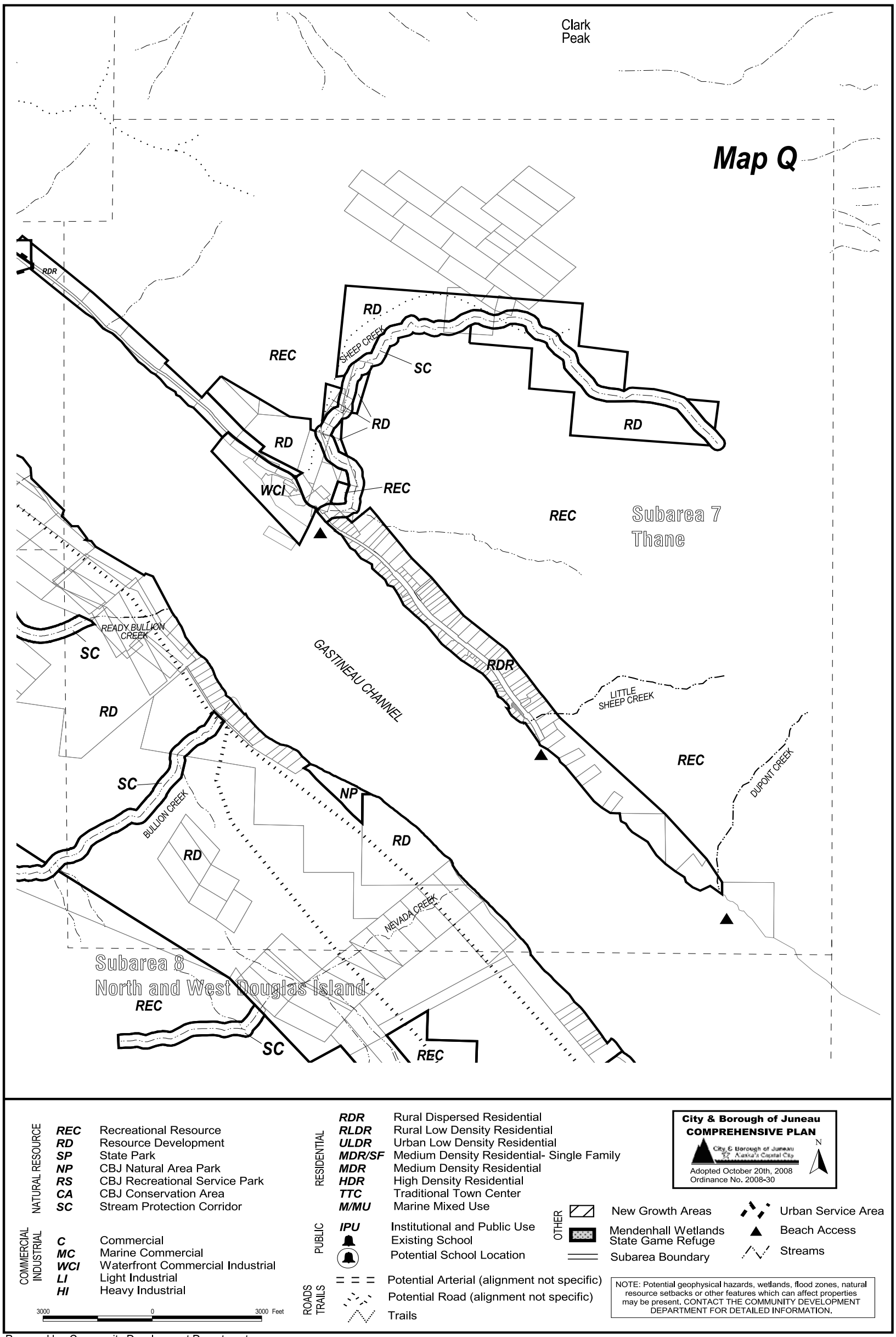

Prepared by: Community Development Department

Map 11.18

Map R

North Douglas Boat Ramp

NP

False Outer Point

SC

SHAMAN ISLAND

CA

Outer Point

RD

Douglas Bench Road Corridor

REC

City & Borough of Juneau Borough Boundary

Trans- Douglas Island Road

Cropley Lake

Subarea 8
North and West Douglas Island

Map 11.19

NATURAL RESOURCE	REC	Recreational Resource
	RD	Resource Development
	SP	State Park
	NP	CBJ Natural Area Park
	RS	CBJ Recreational Service Park
	CA	CBJ Conservation Area
	SC	Stream Protection Corridor
COMMERCIAL INDUSTRIAL	C	Commercial
	MC	Marine Commercial
	WCI	Waterfront Commercial Industrial
	LI	Light Industrial
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4000 0 4000 Feet

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	TTC	Traditional Town Center
	M/MU	Marine Mixed Use
PUBLIC	IPU	Institutional and Public Use
		Existing School
		Potential School Location
ROADS TRAILS		Potential Arterial (alignment not specific)
		Potential Road (alignment not specific)
		Trails

City & Borough of Juneau
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OTHER	New Growth Areas	Urban Service Area
	Mendenhall Wetlands State Game Refuge	Beach Access
	Subarea Boundary	Streams

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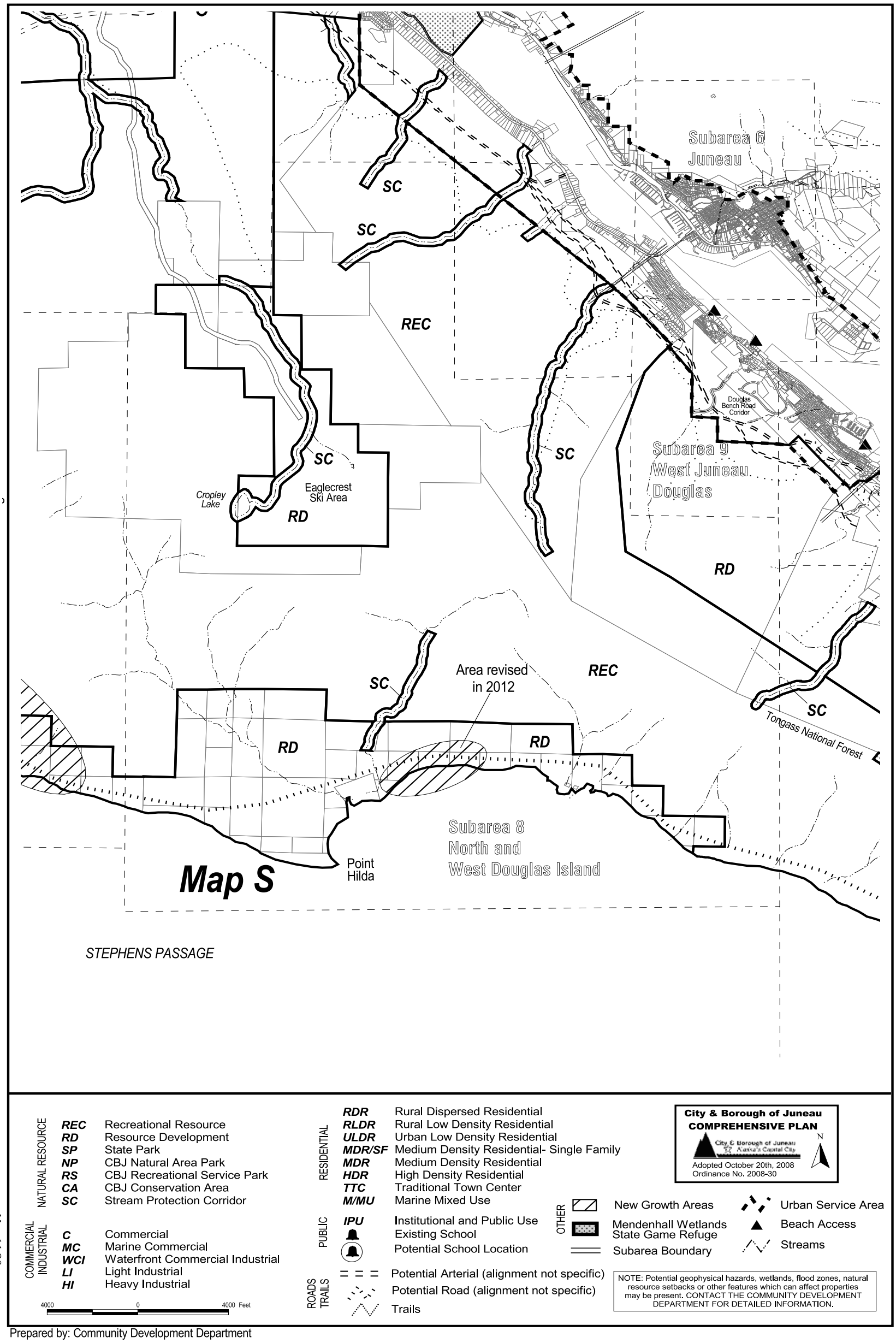

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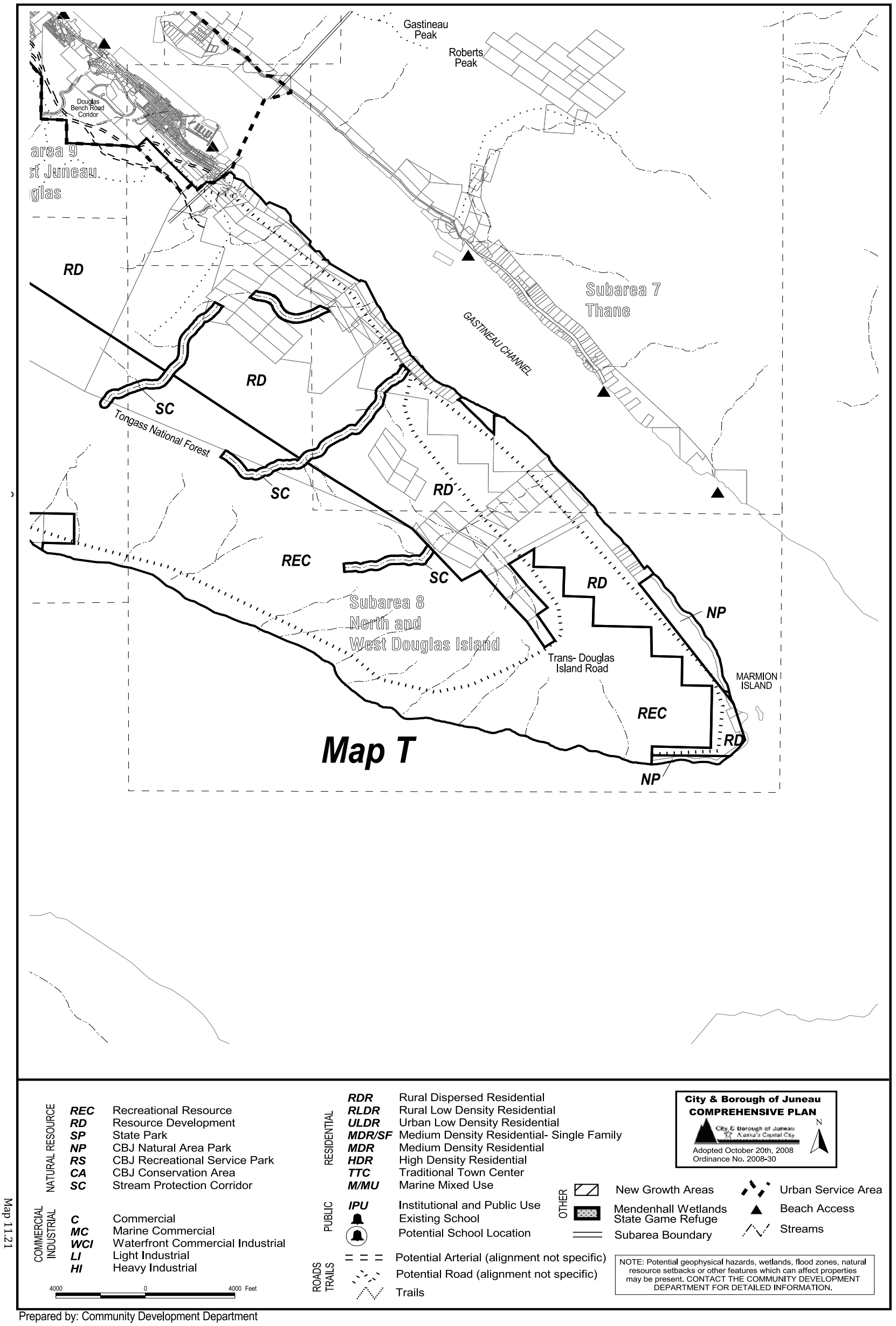
Prepared by: Community Development Department

Map 11.20



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- **MDR/SF** Medium Density Residential- Single Family
- **MDR** Medium Density Residential
- **HDR** High Density Residential
- **TTC** Traditional Town Center
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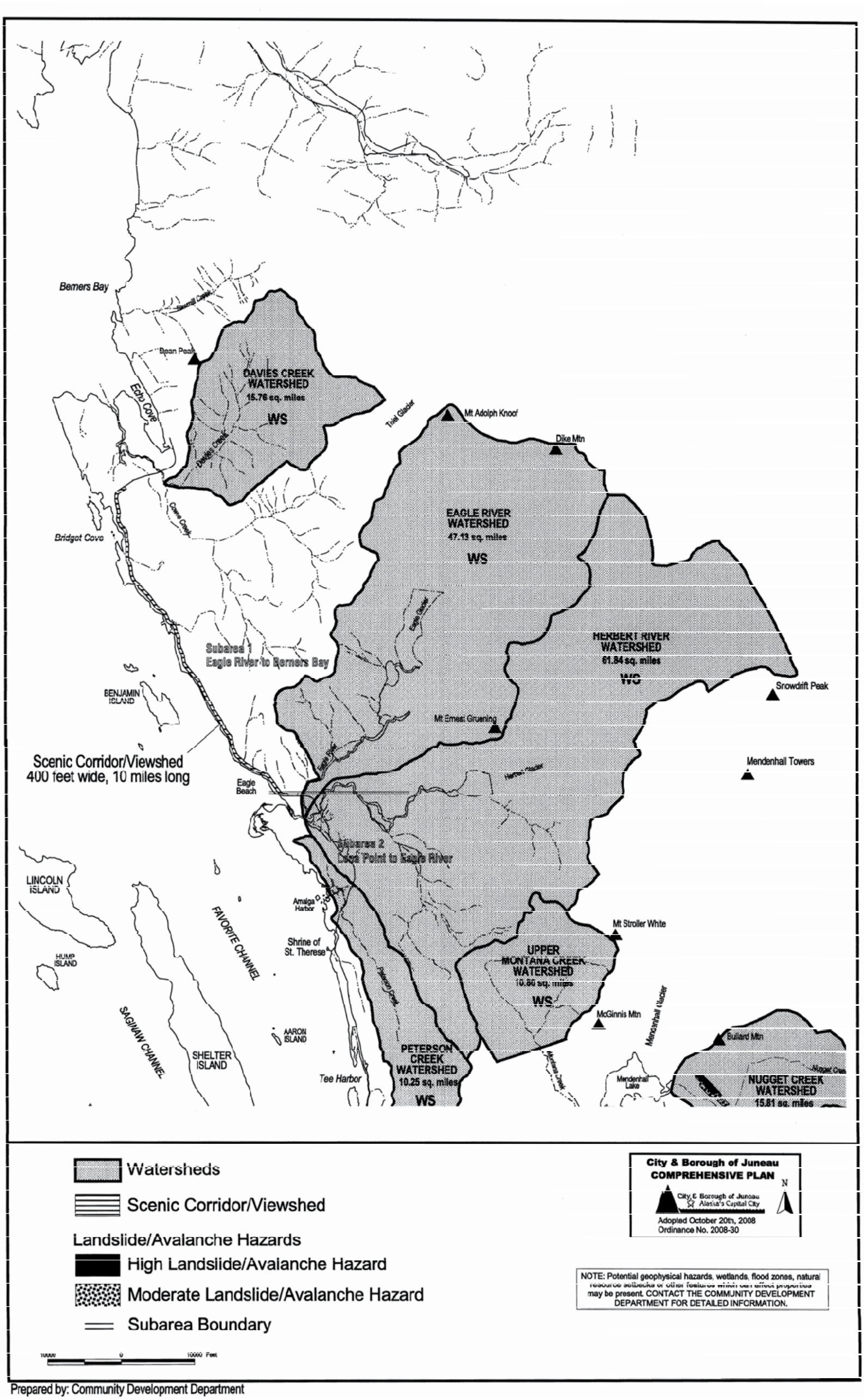
Prepared by: Community Development Department

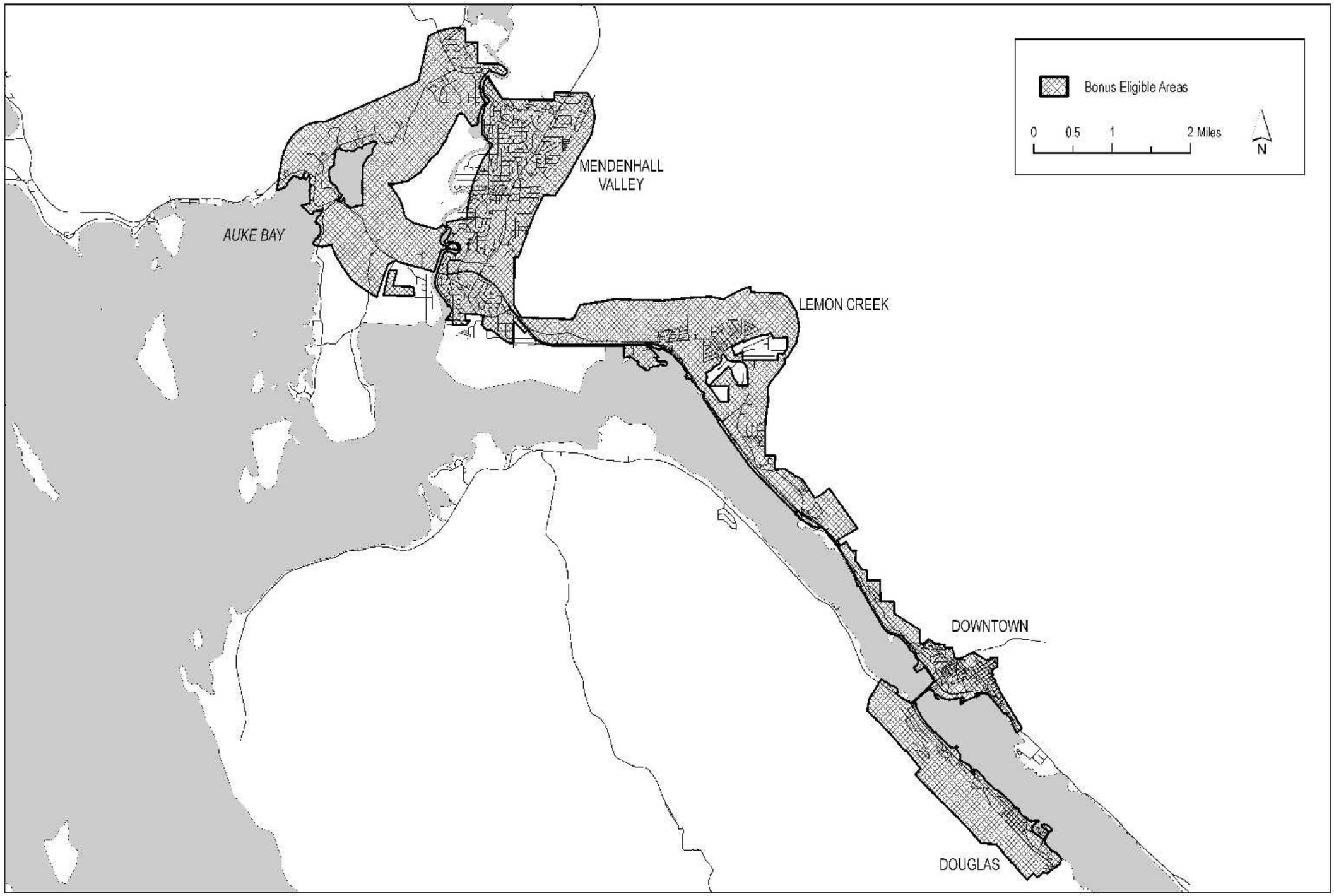
Map 11.21

Watershed, Scenic Corridor/Viewshed, and Hazard Map 1 of 2



Prepared by: Community Development Department

Map 11.22



Map 11.24

Bonus-Eligible (BE) Overlay District Map

Subarea 1: Eagle River to Berners Bay (Map A)

Community Form: Rural, with a New Growth Area

NATURAL RESOURCES AND HAZARDS

Type	*General Location*
Wildlife (Eagles Nests, Sea Lion Haul Out & Rookery, Herring Spawning areas)	Echo Cove, Lynn Canal Shorelines, Bridget Cove, North Island, Mab Island, Benjamin Island
Stream and Lakeshore Corridors	Cowee, Davies, Peterson, and unnamed Creeks; Eagle and Herbert Rivers
Watersheds	Herbert River, Davies Creek & Eagle River
Gravel and Mineral Resources	Gravel in the Eagle and Herbert River corridors, delta/estuary area; Juneau Gold Belt with mining claims and the Kensington Mine on the northwest shore of Berners Bay
Wetlands/Tidelands	Eagle/Herbert River estuary, Echo Cove, Bridget Cove, Point Bridget, Yankee Cove
Hazards	Flooding: Cowee and Davies Creeks, Eagle River, Herbert River, Peterson Creek, and coastal areas
Scenic Corridor/Viewshed	On CBJ-owned lands upland of Glacier Highway from Bridget Cove to Eagle Beach (approximately 10 miles), a 400-foot-wide area
Historic and Cultural Resources	Subarea-wide, Sentinel Island Lighthouse, petroglyphs in Berners Bay

Table 11.1

Guidelines and Consideration for Subarea 1:

1. Preserve valuable publicly-owned lands, including Lynn Canal shorelines areas, as public open space/natural areas, recreation areas, fish and wildlife habitat and scenic corridors with public access.

2. Recognize that Pacific herring are an important indicator and keystone species, and that commercial harvest of this species could be an economic boon to the CBJ if herring populations recover to a level capable of supporting commercial fisheries. Further, as a keystone species upon which other species depend, a healthy and abundant herring population will have an economic ripple effect on other commercial fisheries and tourism. There is, therefore, special concern for the conservation and protection of herring spawning areas located along the east shoreline of Lynn Canal, especially near Bridget Point, Echo Cove, and in Berners Bay.

3. Recognize that there is a special concern for the conservation and protection of Stellar Sea Lion habitat around Benjamin Island, pursuant to the National Marine Fishery Service Stellar Sea Lion Recovery Plan. It is recommended that only research scientist teams visit land on Benjamin Island and that no tourist vessel or recreational vessel approaches the island closer than 1000 yards, per the Recovery Plan.

4. Support the New Growth Area development, including a mixture of residential, recreational a water-related uses, in Echo Cove.

5. With the exception of the Echo Cove New Growth Area, limit residential and non-residential development to very low densities and rural-character development within the subarea to protect sensitive habitat therein.

6. Recognize Berners Bay and the river systems that feed it as important fish and wildlife habitat, recreation and scenic areas that experience significant local and visitor use. Identify and adequately protect a series of un-fragmented fish and wildlife corridors along anadromous fish streams from the uplands to Lynn Canal. If a high traffic road and/or rail facility is proposed within this subarea, provide an adequate wildlife crossing to assure safe passage of wildlife from the uplands to the sea along each anadromous fish stream crossed by the road or railway.

7. Develop a comprehensive, interagency plan for Tee Harbor to Berners Bay that recognizes, protects and enhances fish and wildlife habitat as well as the multiple recreational, educational and scenic resources found in that area.

8. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements. Those recommendations include: (a) enhance the Auke Recreation Area Dive Park; (b) enhance Aantiyeik Park to include a community garden, play structures, restrooms, landscaping, picnic shelters and, in addition to the disc golf course, a BMX trail should be considered; (c) develop cooperative recreation agreements with the Boy Scouts organization for greater public access; (d) develop Sunshine Cove and Bridget Cove for overnight recreation use; (e) plan for recreation in the Echo Cove area and beyond the proposed New Growth Area; (f) connect trails or create loop hiking experiences; (g) encourage the U.S. Forest Service to repair Cowee and Davies trails; (h) protect stream corridors and establish a 200 foot stream buffer on CBJ-owned lands that are not designated for disposal in the 1999 CBJ Land Management Plan on each side of the following creeks: Bridget, Cowee, Davies and any newly-accessible creeks resulting from a new public road; (i) designate a 400-foot fish and wildlife habitat and view shed protection buffer east (upland) of the road on CBJ-owned lands, as indicated on the Subarea Map; (j) evaluate development of an integrated hiking trail between Point Bridget and Point Bishop and provide historical trail and site information to the public; (k) develop a management plan for CBJ lands at Bridget Cove to complement recreational opportunities on the state holdings at Bridget State Park; (l) develop and widely distribute “leave no trace” Best Management Practices (BMPs) brochures or pamphlets to independent users as well as commercial eco-tourism and recreational tourism users of public lands to ensure that users adhere to the BMPs and respect fish and wildlife habitat and, particularly, to ensure water quality of anadromous fish streams and their riparian habitat.

9. Ensure that any extension of Glacier Highway to a Ferry Terminal located at or near the mouth of the Katzehin River, or beyond, for access to the Kensington Mine or points north is designed to provide year-round, energy-efficient safe passage.

10. 10.Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

11. Identify, develop and protect public access places to view the aurora borealis. Establish “dark sky” outdoor lighting codes for the rural and remote areas of the CBJ to protect views of the stars from nighttime glare.

Subarea 2: Lena Cove to Eagle River, Including Shelter Island (Maps B, C, & D)

Community Form: Rural

The Rural Dispersed Residential (1 dwelling per acre) and Rural Low Density Residential (l to 3 dwellings per acre) designations predominate in this Subarea, primarily due to the absence of both public water and public sewer in the area; there are no plans to provide or extend sewer service to this area; nor are there plans to extend water service north of Cohen Drive. The lands in the Auke Nu/Point Lena area were designated Rural Low Density Residential (l to3 dwellings per acre) primarily because of the established development pattern therein.

NATURAL RESOURCES AND HAZARDS

Type	*General Location*
Wildlife (Eagle nests, Herring spawning areas)	Lena Cove, Tee Harbor, Shelter Island, Amalga Harbor, Shrine of St. Therese
Stream and Lakeshore Corridors	Peterson Creek, Shrine Creek, Lena Creek, Tee Creek
Watersheds	Peterson Creek, Herbert River
Gravel and Mineral Resources	Herbert River
Hazards	Flooding: Peterson Creek, Strawberry Creek, all coastal areas
Historic and Cultural Resources	Subarea-wide, Shrine of St. Therese, Auk Rec and Indian Point areas

Table 11.2

Guidelines and Considerations for Subarea 2:

1. Preserve shoreline areas in public ownership as fish and wildlife habitat and public open space/ natural areas with public access to the water.

2. Identify and protect a series of un-fragmented fish and wildlife habitat corridors along anadromous fish streams from the uplands to the Lynn Canal.

3. Where appropriate, continue rural residential development.

4. Encourage development of boat launch facilities at South Tee Harbor.

5. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements for this subarea. Those recommendations are listed in Subarea 1 and include: (a) enhance the Lena Loop Park as a neighborhood park with play areas, dog parks, restrooms and additional parking; (b) enhance Lena Point Park with trail parking, trail improvements, benches and interpretive signs; (c) Continue Tee Harbor to Berner's Bay cooperative management; (d) implement the Master Plan for Amalga Meadows area; and (e) protect stream corridors and establish a 200 foot stream buffer on CBJ-owned lands that are not designated for disposal in the 1999 CBJ Land Management Plan on each side of Peterson Creek and Shrine Creek.

6. The subarea is not served by the public sewer system, and is outside of the Urban Service Area boundary. Since municipal services are not to be provided outside of the urban service area boundary, there is no plan to extend public sewer to the subarea.

7. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

8. Investigate the potential costs and benefits of constructing an access road to existing private properties and disposing of some CBJ-owned properties on Pt. Stephens.

Subarea 3: Auke Bay, Mendenhall Peninsula, & West Mendenhall Valley (Maps E, F, & G)

Community Form: Urban for Auke Bay.

Suburban portions of the West Mendenhall Valley that are serviced by both sewer and water.

Transition from rural to urban in the remainder of the West Mendenhall Valley.

Rural on the Mendenhall Peninsula.

Land use designations on the Subarea map range from open space/natural areas to industrial. Much of this subarea is a Transition area, where higher density development will be considered once public sewer is available and intersections are improved to LOS D or better. Greenbelts are shown for Mendenhall River, Montana Creek, and Auke Lake.

NATURAL RESOURCES AND HAZARDS:

Type	*General Location*
Wildlife (Eagle nests, Herring spawning areas)	Auke Bay, Auk Nu Cove, Mendenhall Peninsula, Mendenhall Wetlands State Game Refuge
Stream and Lakeshore Corridors	Auke Nu Creek, Weydelich Creek, Bay Creek, Lake Creeks, Montana Creek, Mendenhall River, Auke Lake, Jordan Creek, Duck Creek
Impaired Water Body	Pederson Hill Creek (aka Casa Del Sol Creek)
Wetlands/Tidelands	West Mendenhall Valley, Spuhn Island,
Gravel and Mineral Resources	Mendenhall Peninsula, Mendenhall Wetlands State Game Refuge, Montana Creek, Auke Nu Cove
Hazards	Flooding: Montana Creek, West Mendenhall Valley, all coastal areas. Airport Airspace: see FAA 7460 Contours Map and Airport Airspace Drawing (FAR 77 Surfaces), pages 129-130.
Watershed	Montana Creek (above the roaded area)
Historic and Cultural Resources	Subarea-wide

Table 11.3

Guidelines and Considerations for Subarea 3:

1. Conduct an area plan or neighborhood plan for the Auke Bay area that would address residential and non-residential uses in the vicinity of the cove, harbor and University with the goal of creating a Marine Mixed Use, transit and pedestrian-oriented village in Auke Bay. Marine Mixed Use land uses could include: Water-related recreation, eco-tourism, commercial fisheries, sport fisheries, marine-related research and aquaculture, and other private and public use of the waters; shoreline and inland areas of Auke Bay including the University of Alaska Southeast (UAS) campus, student and faculty housing, neighborhood-commercial needs, transportation systems, habitat protection, educational facilities, careful urban design, and viewscape protection measures. This study should address the needs of and should include the participation of all stakeholders including property owners, residents, business operators, University administration, student and faculty, the Alaska Department of Transportation and Public Facilities, all relevant CBJ Departments and Divisions, NOAA staff and researchers and residents of neighborhoods who regularly traverse the Auke Bay area.

2. Protect and provide for continued water-dependent development at the Ferry Terminal and in Auke Bay. Identify suitable areas for float homes, boat houses, and/or live-aboards as affordable housing options; this may include dedicated portions of the harbor for these residences. Adopt design guidelines and development standards for the proposed Auke Bay neighborhood plan and Marine Mixed Use District.

3. Encourage high-density, transit-oriented residential and/or mixed use developments in the Auke Bay "village" area and around the University, particularly for student and faculty affordable housing.

4. Preserve valuable public tidelands, shorelines, creek and stream corridors as fish and wildlife habitat and public open space/natural areas. Acquire land for greenbelts along the Mendenhall River and Montana Creek stream corridors. Identify and protect a series of un-fragmented fish and wildlife habitat corridors along anadromous fish streams from the uplands to the sea.

5. Protect CBJ-owned lands located within 500 feet of each side of the ordinary high water line of Montana Creek from its juncture with the Mendenhall River to its headwaters, in accordance with the scientific analysis of the special functions of Montana Creek's values conducted by the Juneau Chapter of Trout Unlimited and published in November of 2006.

6. When removing trees for development, care should be taken to consider downwind effects and to mitigate against off-site blow down of trees on down-wind properties.

7. Encourage UAS and private property owners to dedicate new public rights-of-way to create an interconnected Auke Bay neighborhood street system.

8. Provide for additional medium- to high- density residential development on CBJ lands within the Mendenhall Peninsula when served with utilities, roads, and other infrastructure and urban services, where high-value wetlands, steep slopes or hazard areas are not present, and where incompatible uses are not present such as within the flight-safety zone of the airport. All prospective tenants and owners of new dwelling units therein should be advised of the aircraft noise associated with the nearby airport operations.

9. Encourage in-fill, small house development in the West Mendenhall Valley. However, in doing so in the West Valley, continue to protect wetlands, avoid flood hazards and provide buffer vegetation and open space/natural areas for privacy and to maintain the rural character of the West Valley community. Encourage clustering of the small cottage and bungalow houses on larger parcels to maximize the land left in a natural state to assure privacy and provide a visual and sound buffer from existing adjacent lower density residential development. New in-fill development should: (1) Preserve as much of existing wooded areas as is practical; (2) design new building forms to mimic adjacent rural development in scale and massing while increasing density; (3) place parking out of view of the street; and (4) incorporate other appropriate building siting, orientation and design techniques to maintain the rural character of the West Valley. In new subdivisions on large parcels, encourage mixed density developments, such as duplex, accessory dwellings and multi-family units interspersed in suitable locations within the development.

10. Prohibit new residential development on CBJ-owned property abutting the outdoor shooting range. Identify the noise contours for the outdoor shooting range and establish a Noise Notification Overlay District encompassing that area and within which any new development must disclose to potential tenants or buyers the locations, hours of operation and types of noise emanating from the shooting ranges.

11. Provide for expansion of the UAS campus, including student and faculty housing and athletic facilities.

12. Allow development of in-fill residential development, such as apartments, condominiums, efficiency or Single-Room-Occupancy (SRO) units, and loft-style housing within new and existing shopping centers.

13. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements for this subarea. Those recommendations include: (a) develop a cultural park at Auke Cape/Indian Point that would include trails, interpretative panels and other low-impact structures; (b) Plan for the future non-motorized use of the Montana Creek area from its juncture with the Mendenhall River to its upper reaches; (c) pursue a location and funding for a second Mendenhall River pedestrian bridge; (d) reserve trail corridors allowing for loop trails between Montana Creek and the Mendenhall Greenbelt; (e) reserve stream and trail corridors on CBJ-owned land behind Windfall Avenue; (f) reserve trail corridors recommended in the West Mendenhall Greenbelt Plan; (g) develop a Master Plan for the Auke Lake area; (h) develop a master plan for trail connections around Auke Lake; (i) develop a trail from Auke Bay Elementary School to Spaulding Meadows Trail; (j) provide direct and safe access to the Auke Bay park and shelter across from Auke Bay School; (k) reserve a trail corridor on the Mendenhall Peninsula; (l) define and improve the non-motorized trail from the end of the private driveway at Smugglers Cove to the end of Engineer's Cutoff, creating a trail around the end of the Mendenhall Peninsula; (m) review river bank modification projects upstream of West Mendenhall Valley Greenbelt and Brotherhood Park; (n) review connection routes with ADOT&PF at Brotherhood Bridge; (o) light the trail at Kaxdigoowu Heen Trail for year-round use; (p) create a neighborhood park for the subarea; (q) investigate the feasibility of creating cross-country running and skiing loops on CBJ land; (r) identify and protect fish and wildlife habitat and game travel corridors; (s) continue to acquire Greenbelt properties along Montana Creek and the Mendenhall River; (t) retain trail access to Spaulding Meadows and to beaches; and (u) acquire high-value University of Alaska Southeast (UAS) wetlands and designate as Open space/natural areas.

14. The sewer system is being expanded to include the industrial area in the southerly part of the West Valley and to the Pederson Hill area. It should also be extended to other areas around the University to accommodate higher density, affordable student and faculty housing. Areas served by newly extended public sewer systems should be up-zoned to accommodate higher density development. Extend municipal water and sewer service to all properties within the Urban Service Area boundary.

15. Pederson Hill Creek (aka Casa Del Sol Creek) is listed as an impaired water body by the Alaska Department of Environmental Conservation (DEC) and, therefore, careful review of future development proposals that could affect the volume, velocity, cleanliness, and overall water quality of this creek and its watershed and tributaries is warranted.

16. Consider the transportation improvements recommended in Chapter 8 of this Plan. Investigate the feasibility of a roadway extending from Glacier Highway and running east of Auke Lake through the Pederson Hill area to the Mendenhall Back Loop Road; this may be designed as a collector street serving development of the Pederson Hill area and could also be considered as a possible bypass of the Auke Bay area.

17. Encourage beautification and buffering along major roadways.

18. Identify scenic view corridors as seen from public vista points and preserve them through building height restrictions, building massing and orientation restrictions as conditions of a rezoning, subdivision easements and careful building spacing requirements.

19. Identify historic and cultural resources within the subarea. Projects that may impact resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

20. Work with ADOT&PF to provide sidewalks, bicycle paths, and/or trails separated from the road travelway along existing and newly-constructed arterial and collector roadways to provide safe and efficient access and to reduce pedestrian and bicycle/motor vehicle conflicts.

Subarea 4: East Mendenhall Valley & Airport (Maps F & G)

Community Form: Suburban/Urban

NATURAL RESOURCES AND HAZARDS:

Type	***General Location***
Wildlife (Eagle nests)	Airport vicinity, Mendenhall Wetlands State Game Refuge
Stream and Lakeshore Corridors	Mendenhall River, Duck and Jordan Creeks
Wetlands/Tidelands	Nugget Creek, Mendenhall Wetlands State Game Refuge
Gravel and Mineral Resources	Mendenhall River corridor, upper part of valley
Impaired Water Bodies	Duck Creek, Jordan Creek
Hazards	Flooding: Mendenhall River, Duck Creek, Jordan Creek, all coastal areas. Avalanches and Landslides: Thunder Mountain. Airport Airspace: see FAA 7460 Contours Map and Airport Airspace Drawing (FAR 77 Surfaces), pages 129-130.
Watershed	Nugget Creek with a potential hydroelectric source at Nugget Falls
Cultural and Historic Resources	Subarea-wide

Table 11.4

Guidelines and Considerations for Subarea 4:

1. Maintain the density of existing neighborhoods while encouraging in-fill development of low- to moderate-income affordable housing.

2. Provide for increased community commercial development close to existing commercial areas in the lower valley.

3. Encourage airport expansion in the area designated in the Airport Master Plan. Maintain adjacent publicly owned wetlands and tidelands for public open space/natural areas or resource protection, unless required for aviation or public safety purposes. The CBJ should facilitate Airport Management Plans to meet FAA regulations regarding Runway Safety Areas (RSA) and other similar safety measures.

4. Utilize CBJ-selected lands for high-density residential development, recognizing constraints o sensitive areas.

5. Maintain public access to the Mendenhall Wetlands State Game Refuge (MWSGR) along the airport dike.

6. Duck Creek and Jordan Creek are listed as impaired water bodies by the Alaska Department of Environmental Conservation (DEC) and, therefore, careful review of future development proposals that could affect the volume, velocity, cleanliness, and overall water quality of these creeks and their watersheds and tributaries is warranted. The CBJ should support community efforts to educate and, perhaps, regulate snow removal and storage practices as described in 7.7 - DG1.

7. Seek new industrial zoning districts to compensate for the encroachment of existing industrial districts by retail, office and other non-industrial commercial uses. Designate the industrial districts that have visual connection from and vehicular access to major thoroughfares and that have already been encroached upon by retail and office uses as heavy commercial/light industrial districts within which industry may remain and non-industrial commercial uses can expand. In other industrial districts, prohibit retail, office, residential and other non-industrial or non-Public uses.

8. Expand the Mixed Use District in the Mendenhall Mall vicinity that would incorporate general commercial uses, high density residential use and public transit services. Make the most efficient use of parking by incorporating housing over a garage with retail shops wrapping around the ground floor. Student or senior housing within the Mall or over the garage should not be required to provide parking spaces.

9. Consider the transportation improvements for this subarea discussed in Chapter 8 of this Plan and provide for pedestrian and bicycle access to schools, parks and shopping areas.
The CBJ Area Wide Transportation Plan identifies ten priority improvements for the Mendenhall Valley/Nugget Mall and Airport area, none of which have been included in the 2006 to 2008 State Transportation Improvement Plan (STIP) funding. As such, local support for improved capacity of the transportation system will be needed to accommodate new development. Such new development should focus on medium-to-high density residential, commercial and employment centers that can be largely serviced by public transit. A Transit Oriented Corridor with transfer stations at the Malls and/or the Airport should be able to accommodate this new, compact in-fill development.

10. The East Mendenhall Valley is entirely serviced by public sewer and water systems. Future replacement of aging utilities will be required.

11. Drainage problems exist in the central East Mendenhall Valley. Incremental additions to a storm drain system are being made or are in the planning stages. Therefore, adopt a set of overall guidelines that address the treatment and placement of runoff.

12. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements. Those recommendations include: (a) Continued development of the Under Thunder trail corridor at the base of Thunder Mountain; (b) completion of Dimond Park; (c) development of a Mendenhall Valley swimming pool; (d) a pedestrian/bicycle trail from Dimond Park to the Airport Dike trail; (e) assured access to the Airport Dike Trail and a connector trail from the airport to that trail; (f) acquisition of parcels along Duck Creek; (g) establishment of a stream corridor along Duck Creek just south of Berner's Avenue; (h) establishment of a 200 foot wide greenbelt along Jordan Creek where it traverses CBJ owned property, with the exception of that portion of the creek lying within the Juneau International Airport's property, for which the setback should be determined on a case-by-case basis, consistent with 7.3 - DG2 and the Airport Manager's recommendation; (i) acquisition of Smith/Honsinger parcel outside of the pond area for natural area and scenic corridor conservation; (j) develop a community garden site; and (k) review the area for suitability for mini-parks. Work with the FAA to ensure that these projects do not negatively affect flight safety due to impacts on bird habitat.

13. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are

discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

14. Protect historic trails and sites at the Mendenhall Glacier area.

15. Coordinate all development within the sphere of influence of Duck and Jordan Creeks with the Alaska Department of Environmental Conservation (DEC) to ensure that development meets the guidelines of the creek restoration plan, called the TMDL Document.

16. Study geophysical hazards in this subarea and adopt an amended Hazard Area overlay map following the completion of that study.

Subarea 5: Switzer Creek, Lemon Creek, & Salmon Creek (Maps G, H, & K)

Community Form: Suburban/Urban

NATURAL RESOURCES AND HAZARDS:

Type	*General Location*
Wildlife (Eagle nests)	Vanderbilt Hill, Lemon Creek and Switzer Creek
Stream and Lakeshore Corridors	Lemon, Switzer, and Vanderbilt, Salmon, and unnamed Creeks
Wetlands/Tidelands	Mendenhall Flats, Lower Lemon Creek, Switzer Creek, Vanderbilt Creek
Gravel and Mineral Resources	Lemon Creek, Hidden Valley
Impaired Water Bodies	Jordan Creek, Lemon Creek, Vanderbilt Creek
Flooding	Lower Lemon Creek/Switzer Creek, all coastal areas
Hazards	Flooding: Salmon Creek Dam Inundation Area. Landslide and Avalanche: Thunder Mountain, Upper Lemon Creek Valley
Watershed	Upper Salmon Creek
Cultural and Historic Resources	Subarea-wide

Table 11.5

Guidelines and Considerations for Subarea 5:

1. Conduct a neighborhood plan for the Lemon Creek and Switzer Creek areas to (1) address livability concerns for residential areas, (2) accommodate the land use and transportation needs of commercial and industrial uses, (3) address recreational and natural/conservation area needs, (4) identify transportation improvements, especially pedestrian- and bicyclist-related safety improvements, and (5) reduce incompatible uses and minimize or mitigate adverse impacts of such incompatible uses related to air quality (noise, dust, fumes, odors), public safety and natural resource protection.

2. Provide for additional medium- to high density residential development in areas with access to arterial roadways from collector streets. Encourage the efficient use of land by allowing non-family housing, such as for students, single-adults or seniors, in mixed use districts within shopping cen

or malls. Increase building height limits and decease or eliminate parking requirements for s residential developments where adequately served by public transit.

3. Restrict residential development in areas where off-site impacts of sand and gravel extraction operations, such as noise, dust, heavy truck traffic, would adversely affect residents unless it were assured that residents of the proposed housing would not be so adversely affected, such as for transition or temporary housing.

4. Provide a safe pedestrian and bicycle circulation system in the Lemon Creek and Switzer Creek areas, per the Area Wide Transportation Plan, the 2009 Non-Motorized Transportation Plan, the Safe Routes to Schools plan, and Chapter 8, Transportation, of this Plan.

5. Protect access to Lemon Creek Trail, Salmon Creek historic Trail and Heintzleman Ridge Trail.

6. Encourage the construction and/or retention of a buffer and initiation of a beautification effort along all major roads.

7. Reserve wetlands and tidelands in public ownership for fish and wildlife habitat and open space/ natural areas.

8. Designate CBJ-owned areas outside the Salmon Creek Dam inundation hazard area for Bartlett Regional Hospital expansion hospital and related medical facilities.

9. Allow for expansion of state office complex facilities adjacent to existing offices within public/ institutional land use designation areas west of Switzer Creek but not along shoreline areas.

10. Identify sufficient land to accommodate commercial and industrial uses. Adjust the boundary between commercial and industrial lands in the Vanderbilt-to-Lemon Creek area to account for current conditions and market demands. Provide additional buildable land for heavy industry and prohibit higher intensity uses, such as retail, office and residential uses, within the heavy industrial areas.

11. Renninger Road serves a CBJ school and water reservoir and an affordable rental housing development and could further be used to access other CBJ lands suitable for development of affordable housing.

12. Jordan Creek, Lemon Creek and Vanderbilt Creek are listed as impaired water bodies by the Alaska Department of Environmental Conservation (DEC) and, therefore, careful review of all future development proposals that could affect the volume, velocity, cleanliness, and overall water quality of these creeks and their watersheds and tributaries is warranted. Coordinate all development within the sphere of influence of Jordan, Lemon and Vanderbilt Creeks with DEC to ensure that development meets the guidelines of the creeks' restoration plans, called the TMDL Document.

13. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements. Those recommendations include: (a) construction of a coastal trail along Egan Drive or along the "inside" or north side of Egan Drive, connecting Sunny Point to neighborhoods to the east and west; (b) Upgrade the Dzantik'i Heeni Middle School and the Switzer Creek/Richard Marriott trail; (c) construct a covered basketball court/play area at Dzantik'i Heeni Middle School; (d) reserve a stream corridor on Switzer Creek; (e) resolve Lemon Creek Trail issues; (f) develop an All-Terrain-Vehicle (ATV) or Off-Highway Vehicle (OHV) course in the Upper Lemon Creek area; (g) develop a trail from the Sunny Point intersection to the Pioneer's Home intersection and along the Pioneer's Home marsh with an accessible viewing platform for bird watchers; (h) protect access to the Heintzleman Ridge trail; (i) review the area for suitability for mini-parks; (k) establish a community garden area; (l) study the Lemon Creek area for suitable park sites; and, (m) continue ADA improvements at Twin Lakes.

14. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for

documentation and technical assistance toward preservation and/or curating of the demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

15. Since views of the water are a highly-rated value by residents, buildings in the (WCI)-designated areas should be situated or oriented to retain views of the water between buildings.

Subarea 6: Juneau (Maps K, M, & N)

Community Form: Urban

The Juneau Subarea is a mixed use community with land use designations in the core downtown area ranging from the rural Resource Development (RD), to Recreation Resource (REC) on the steep northern edges of the core area and tiering down the slopes to the Channel with the more urban Medium Density Residential (MDR), Medium Density Residential/Single Family (MDR/SF), Urban Low Density Residential (ULDR), Traditional Town Center (TTC) , Commercial (C), Institutional and Public Use (IPU) and Waterfront Commercial (WC) districts.

East of the core area toward Thane are Traditional Town Center (TTC), Resource Development (RD), Industrial (I), Waterfront Commercial, Waterfront Commercial/Industrial (WCI), Institutional and Public Use (IPU), and Rural Dispersed Residential (RDR) districts. The downtown area includes special overlay districts, including parking districts, an historic district, a Waterfront District that is the subject of the adopted Long Range Waterfront Master Plan, along with Landslide and Avalanche Hazard Zone designations.

NATURAL RESOURCES AND HAZARDS:

Type	*General Location*
Wildlife (Eagle and bears)	Six eagle nests around downtown Juneau (2006)
Stream and Lakeshore Corridors	Gold Creek upstream from Cope Park
Wetlands/Tidelands	Gold Creek Tidelands
Hazards	Flooding: Gold Creek, all coastal areas. Landslide/Avalanche: Mt. Juneau, Mt. Roberts, Gold Creek Basin, Last Chance Basin
Watershed	Gold Creek/Last Chance Basin
Cultural and Historic Resources	Subarea-wide

Table 11.6

Guidelines and Considerations for Subarea 6:

1. Preserve the scale and densities of the older single family neighborhoods in the downtown area, including the Casey-Shattuck “flats” and Star Hill historic districts, Chicken Ridge, Basin Road, Mt. Maria, the Highlands, and the higher density apartments and homes in the vicinity of the Federal Building.

2. Encourage the retention of existing dwelling units in or near the older residential neighborhoods to avoid exacerbating traffic and parking congestion and to preserve the privacy and quiet of those neighborhoods.

3. Strengthen and enhance the Capitol Complex in the downtown Juneau area. Provide for orderly expansion of state government facilities in the vicinity of the State Capitol and the State Office Building.

4. Develop a cooperative agreement with owners and tenants of downtown buildings, as well as their lenders, insurance, legal, design, and construction professionals, for continuing, incremental improvements to those buildings, such as installation of sprinklers, to lessening the threat of structural fires in and near the downtown historic area.
   Many of the buildings in this area are built with virtually no fire resistant materials, are built too close to their property lines to allow a fire break or room for fire fighters to stop the spread of fire and have openings such as doors, windows and vents in their side walls that would allow fire to spread very quickly to adjacent buildings. Many are built on pilings, leaving a common crawl space that cannot be protected by fire fighters.
   Loss of the downtown historic district in a fire would have significant negative impact to the aesthetics and economy of the CBJ, as one of its key tourist attractions is the historic character of downtown. A fire could spread through these wooden buildings very quickly and, despite the best efforts of fire fighters, probably could not be controlled.

5. Limit development in landslide/avalanche hazard areas; rezone publicly-owned land in those hazard areas as Resource Protection zones.

6. Preserve view corridors of the compact, historic downtown, as viewed from the Channel toward the historic districts and their mountain backdrop, and preserve views of the Channel, as viewed from public streets in downtown, through height restrictions and building orientation and spacing guidelines along the downtown waterfront.

7. Preserve public access to the shoreline and waterfront areas. Provide for public access, open space/ natural areas and water-dependent and water-related uses on the downtown waterfront via the seawalk with connections to the existing pedestrian system.

8. Support the establishment of a Cultural Campus anchored by the Alaska State Museum, the Alaska State Library in the State Office Building, the Convention Center and a new Performing Arts Center at the former National Guard Armory site, inclusive of the area bordered by Gold Creek, Willoughby Avenue, Main Street, and Egan Drive. With Centennial Hall serving as the visitor and convention center and two hotels located within these boundaries, the area is readily accessible both to residents and visitors, and has some stature as the heart of our state's culture. Adding a performing arts center to this "campus" would solidify its position, drawing more people to the area and reinforcing the year-round health of the adjacent business district.

9. Protect and facilitate access to Mt. Juneau and Mt. Roberts trails.

10. Promote mixed uses downtown. Encourage small-scale neighborhood-serving retail and personal service businesses and increased multifamily development within the urban center. Encourage housing over ground-floor retail space, Single-Room-Occupancy (SRO) dwellings and/or loft-style housing in downtown.

11. Encourage use of the downtown waterfront area as a mixed use waterfront serving residential, recreational, tourist, and maritime uses as identified in the CBJ-adopted Long Range Waterfront Plan. Such development should avoid view blockage of the downtown historic district as viewed from Gastineau Channel.

12. Develop design guidelines for buildings in downtown that create a year-round design aesthetic that is attractive and respects the historic and contemporary urban character of the district, particularly for display window treatments, signage and outdoor lighting of downtown commercial buildings.

13. Provide additional parking and fast, mass transit opportunities, per the downtown subarea guidelines and implementation actions identified in Chapter 8 of this Plan, Transportation, and in the Willoughby District Land Use Plan. Develop a parking management component of a Downtown Juneau Transportation Management Program that could include the following elements:

    A. Establish a covered walkway network throughout downtown.

B. Establish a parking policy that will guide planners in determining the amount of parking that should be provided for specific uses downtown.
The CBJ government should re-examine the parking requirement for development of residential units and for tourist-oriented uses in downtown.
In addition to the Fee-In-Lieu-of-Parking program, the CBJ government should provide alternatives, such as participation in a coordinated Downtown Transportation Management Program, for downtown developers whose proposals do not meet on-site parking requirements. Provisions should be added to accommodate use of parking structures, shuttles, and other means to meet the parking need. However, ensure that these programs do not induce property owners to demolish historic structures to make way for higher intensity uses or taller structures.

C. Modifications in the current management of the existing parking supply, such as shared daytime and nighttime and week-day and week-end parking, should be made to make parking more accessible to patrons of area cultural arts or commercial businesses and for area residents.

D. Development of additional parking supply: construction of centralized parking structures should be phased in and reevaluated on a case-by-case basis. Surface lots can be established on a temporary basis to act as place-holders for potential future structures and provide additional parking while a centralized structure is being developed and the initial use of the structure evaluated.

E. Management of downtown parking should be centralized, though still coordinated with other CBJ departments, for all aspects of the parking program. The parking program should be continually-monitored to determine how programs are working. The management of the downtown parking program is an on-going process that needs continuous review and revision. The CBJ government needs to involve the state and federal governments in shared development of solutions, since parking demand created by state and federal offices are a major factor in downtown parking shortfalls.

F. The CBJ should continue its efforts to develop a convenient transportation terminal near downtown. The terminal should provide a transfer station for mass and rapid public transit where commuter busses, and possibly a light rail system would connect to shuttle busses for localized distribution. Commuters may park their automobiles at the terminal, and catch a shuttle to the downtown core.

G. Other methods suggested to ease the parking problem downtown include construction of a light rail or similar system between the valley and town, supplemented with fast, efficient, localized shuttles; and development of high-density mixed use, but predominantly residential, areas that would provide the opportunity for people to live near their work, shopping and recreation needs, thereby significantly reducing or eliminating the need for a private vehicle altogether.

H. Another suggestion related to parking is to eliminate the parking requirement for certain affordable high-density dwelling units in the downtown core area, such as the small, Single Room Occupancy (SRO) units, other student housing, senior housing and/or seasonal worker housing whose occupants are likely not to own vehicles. This would facilitate the development of affordable housing downtown that, in turn, would create a more dynamic, 24-hour downtown and would free up rental housing elsewhere in the borough. This concept may not work for all types of dwelling units developed in downtown, such as loft housing, family-size housing or artist housing whose occupants are more likely to own vehicles; those developments may participate in the downtown Fee-in-Lieu of Parking program established in 2006.

14. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements. Those recommendations include: (a) advertise and schedule public use of the Terry Miller Legislative Affairs Building that is consistent with the office use therein; (c) implement the Cope Park Master Plan; (d) retain the Last Chance Basin in its undeveloped condition and allow for year-round recreation use where there are no

avalanche hazards; (e) assist with the stabilization of historic buildings in Last Chance Basin; (f) support construction of a bicycle and pedestrian lane along Thane Road; and (g) designate a downtown community garden site on CBJ property.

15. Consider establishment of an alternative local roadway from Egan Drive in downtown Juneau to the industrial barge terminal and Thane Road that by-passes the South Franklin/Cruise Ship Terminal area.

16. Consider mechanisms to encourage and allow residential development on Gastineau Avenue by eliminating the parking requirement for uses whose occupants or visitors would travel by walking, bicycling or by public transit.

17. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

18. 18. Assure a Gold Creek Protection Zone, as shown on Map M, and within which no structures or activities shall be allowed except as needed by the U.S. Coast Guard for its purposes or as allowed by the Alaska Department of Fish and Game for habitat maintenance and enhancement.

19. When considering applications for building permits for commercial uses within the downtown Juneau area, consider the potential noise impacts of mechanical equipment or patrons on adjacent residential uses. It may be appropriate to establish a noise ordinance for the downtown Juneau subarea where case-by-case analysis, conditions of permits and enforcement activities are not practical to solve noise problems.

Subarea 7: Thane (Maps P & Q)

Community Form: Rural

Designations on the Subarea map are primarily Rural Dispersed Residential--RDR (one dwelling unit per acre) along Thane Road, and Recreation Resource—REC inland of the RDR corridor. There is a Waterfront Commercial/ Industrial area west of the Sheep Creek beach area.

NATURAL RESOURCES AND HAZARDS:

Type	*General Location*
Wildlife (Eagle nests)	9 eagle nests along shoreline (in 2006)
Stream and Lakeshore Corridors	Sheep Creek, DuPont Creek
Habitat	Sheep Creek Valley
Gravel Resource	Sheep Creek
Hazards	Flooding: Lower Sheep Creek, all coastal areas. Avalanche/ Landslide: Numerous chutes along Thane Road
Cultural and Historic Resources	Alaska-Juneau and Alaska-Gastineau Mines

Table 11.7

Cultural and Historic Resources Alaska-Juneau and Alaska-Gastineau Mines

Guidelines and Considerations for Subarea 7:

1. Allow for continued Rural Dispersed Residential development along the existing Thane Road corridor, provided that, in new developments, sanitary septic systems can be adequately monitored by the property owner and assurances provided to the CBJ that these systems will remain in adequate working condition for the useful life of the permitted use on the property. Failed septic systems should not be "bailed out" by extension of municipal sewer service unless residential densities of at least ten (10) units per gross acre are provided to the subject property. Lands to which sewer service is to be provided must be included within the Urban Service Area boundary.

2. Recognizing the growth potential of Thane and areas south of Thane, it is important to also recognize the limitations of Thane Road. When reviewing development permit applications, consider that the Thane Neighborhood Association describes Thane Road as "in terrible condition: humped in the middle, falling off the cliff on the channel side in several places, full of pot holes and dips, narrow, with no shoulders. Drivers tend to crowd the middle of the road, which can be quite dangerous if the vehicle is a wide-bodied, slow-moving tour bus with extended side view mirrors that encroach even further into the opposite lane. This dangerous condition is compounded by the popularity of Thane Road as a jogging/walking/biking route." Several portions of Thane Road were reconstructed in 2012, and those portions of the road had many of the safety concerns listed above removed; other portions of the road were not reconstructed, however, and most of the reconstructed portions still do not have shoulders. Safety concerns remain in this corridor, especially for bicyclists, pedestrians, and runners.
   Any substantial increase in traffic to the area, either associated with new residential development or increased commercial recreational/tourism use of the area, should be accompanied by the provision of a separated pedestrian and bicycle pathway or widened shoulder. Furthermore, school buses should be provided pull-outs or other facilities to allow buses to pull out of the travel lane to allow other vehicles to pass after children have safely crossed the street.
   Thane Road is a state ROW, the CBJ has no authority to upgrade this road; the CBJ government should work with ADOT&PF to address these safety concerns.

3. Thane Road has become an important transportation corridor with development of the Rock[illegible] area and tourist destinations around Sheep Creek. Therefore, the CBJ government should encourage ADOT&PF to make reconstruction of Thane Road a high priority and, at the least, the development of separated pedestrian and bicycle paths along Thane Road from Mt. Roberts Street to Sheep Creek beach is essential. However, such a separated pathway may need to take the form of a shoreline trail, boardwalk or pathway, due to limitations in rights-of-way easements along the road and steep terrain thereon.

4. Maintain non-motorized recreational access to the Sheep Creek basin, creek and beach areas while minimizing impacts to the existing recreational and fish and wildlife habitat values of the area. Install, maintain and enforce motorized vehicle barriers to access points to area trails and beaches.

5. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

Subarea 8: North & West Douglas Island (Maps I, J, K, L, Q, R, S, & T)

Community Form: Predominantly Rural.

Urban near the Douglas Bridge.

Two New Growth Areas in West Douglas.

NATURAL RESOURCES AND HAZARDS:

Type	*General Location*
Wildlife (Eagle nests)	25 eagle nests along North Douglas shoreline and 60 along West Douglas shoreline (2006 data)
Stream and Lakeshore Corridors	Eagle, Peterson, Fish, Grant, Falls, Neilsen, Hendrickson, Johnson, Ninemile, and Hilda Creeks
Wetlands/Tidelands	Shoreline between Fritz Cove and Kowee Creek (including the Mendenhall Wetlands State Game Refuge), along and above North Douglas Highway
Gravel and Mineral Resource	Small area on lower Fish Creek, area near Juneau-Douglas Bridge, Eagle Creek area
Hazards	Flooding: Lower Fish Creek, Lower Peterson Creek, all coastal areas. Landslide/Avalanche: Hendrickson Creek, Upper Fish Creek, and various hillside areas, including the vicinity of Eaglecrest Ski Area
Watershed	Upper Fish and Hilda Creeks
Cultural and Historic Resources	Treadwell ditch, Cropley Lake, 3rd Cabin area (Dan Moller trail/ Kowee Creek)
Scenic Corridor/Viewshed	One-quarter mile each side of Fish Creek Rd.; Water side of North Douglas Highway from Fish Creek Park to False Outer Point Beach Access
Adopted Subarea Palns	West Douglas Concept Plan, Land Use Chapter 6

Table 11.8

Recognizing the growth potential of both North and West Douglas, it is important to also recognize the limitations of North Douglas Highway. North Douglas Highway is a two-lane, paved minor arterial roadway with no sidewalk, separated pedestrian pathway or bicycle lane, operated and maintained by the State Department of Transportation and Public Facilities (ADOT&PF). It is also a local access residential street with over 500 private driveways accessing directly to the road. This creates dangers to the local users and those passing through to recreation destinations. Any substantial increase in traffic to the area, either associated with new residential development or increased commercial recreational/tourism use of the area, should be accompanied by the provision of separated pedestrian and bicycle pathways on each side of the road. Furthermore, school buses should be provided pull-outs or other facilities to allow buses to pull out of the travel lane to allow other vehicles to pass after children have safely crossed the street.

Portions of West Douglas Island are designated as New Growth Areas and can accommodate over 2,000 new residential units along with commercial, industrial and recreational facilities. All utilities and services would need to be provided and self-contained within these New Growth Areas once road access is assured. These New Growth Areas are intended for phased development in accordance with the West Douglas Concept Plan, Chapter 6.

North Douglas Highway is accessed solely by the Juneau-Douglas Bridge. Vehicle traffic at the intersection bridge landing at Tenth Street and Egan Drive exceeds its design capacity in the morning commute peak period of from around 7:30 AM to 8:30 AM (snow conditions extend this peak period to from around 7:00 AM to 8:30 AM). A new roundabout/traffic circle was installed at the Island terminus of the Juneau-Douglas Bridge that has increased the traffic flow of that intersection to a level of service (LOS) C or better; however the mainline terminus of the bridge at Tenth Street and Egan Drive is at a LOS E or F in the morning peak period during the 7 to 9 AM commute. In 2006, about half the motorists traveled straight across Egan Drive or turned right, indicating that they work in downtown Juneau. It is likely that residents of new housing on Douglas Island will have the same employment and commute patterns. Even if all the new residents commute by public transit, the current capacity of the Juneau-Douglas Bridge terminus at Tenth Street and Egan Drive cannot accommodate these additional vehicle trips and the traffic volume capacity must be expanded and/or staggered work hours for downtown Juneau government workers must be mandated and enforced.

A December 2002 ADOT&PF report recommended several options for expanding capacity and improving the LOS on the Juneau-Douglas Bridge. The existing roundabout at the Douglas Island terminus was recommended and implemented. The CBJ-accepted improvements to the mainland terminus at Tenth Street and Egan Drive have not been funded by ADOT&PF. Further analysis of potential improvements to the mainland terminus of the bridge may be needed, along with community understanding of the need for the improvements, and community cooperation to fund and build them.

Along with the Juneau-Douglas Bridge improvements, a North Douglas crossing of Gastineau Channel is needed to accommodate new development in the West Douglas New Growth Area. Douglas Island has the most buildable land in the CBJ (more flat and dry than is available on the mainland) and it is essential to provide a North Douglas crossing to Douglas Island in order to ease the CBJ's critical housing crisis. Careful analysis of the location and configuration of the North Douglas terminus, or "landing," of this new bridge is needed, along with a careful analysis of the ways in which traffic to and from West Douglas is conveyed. The conveyance of traffic to new development in North Douglas or West Douglas may be accomplished in the long-term by road and light rail or heavy rail facilities and, therefore, the right-of-way for transport should be wide enough to accommodate fixed-guideway, motorized and non-motorized transport. The analysis of transport systems to North and West Douglas from a new bridge landing should be conducted in conjunction with a neighborhood planning effort for North Douglas. See also the transportation discussion for Douglas Island in Chapter 8 of this Plan, and the Community-Preferred Alternative location for the North Douglas Crossing identified in the 2007 North Douglas Crossing Public Involvement Project and Resolution 2415(am), Vanderbilt Hill.

Guidelines and Considerations for Subarea 8:

1. In the near term, conduct a neighborhood plan for North Douglas to address current and anticipated neighborhood issues such as traffic, transit, pedestrian and bicycle safety, residential uses, densities and utilities, parks, open space, access to water bodies, community gardens, neighborhood-serving commercial uses, and recreational uses for local and CBJ residents as well as regional and international visitors. This plan should incorporate engineering, costs and environmental assessments and findings of a North Douglas bridge landing. This transportation analysis of the bridge and West Douglas traffic conveyance should be combined with the comprehensive North Douglas subarea planning effort that should addresses transportation, utilities, in-fill housing, recreation and open space/natural areas, and public safety issues in a community-wide, holistic approach. The North Douglas Crossing was not received favorably by the public in the 2010 voting on a ballot proposition to fund construction of the crossing; however, the language on the ballot specified one location in particular, and did not explain the long history of this project or its importance to Juneau's future. A new bridge landing in North Douglas should be carefully designed to avoid a physical separation of the North Douglas community, while preserving its rural character.

2. In its current condition, the northwest, west and southern areas of Douglas Island are in a natural, undeveloped state. Portions of the northwest island provide a recreational resource for the whole community. In addition to Eaglecrest, there are miles of shoreline and many acres of unimproved park area. A unique feature is a mile-long stretch of waterfront roadway from the North Douglas boat launch facility to False Outer Point. This corridor offers a world class vista of the Mendenhall Glacier, Mendenhall Peninsula and small islands. This area should be designated a scenic corridor both locally and with the state ADOT&PF. No obtrusive structures should be built on the water-side of the road and any development within this view corridor should assure the preservation of these views

and should enhance the open space/natural areas, public access and non-motorized [illegible] the corridor. With the exception of boat launch facilities at the boat harbor, no permanent structures associated with commercial activities should be permitted along the shore side of the road from Cove Creek to False Outer Point.

3. The un-roaded shoreline on the west side of Douglas Island has development potential, both for urban residential use and for port development. The westerly shoreline is owned almost entirely by the Goldbelt Corporation and the land immediately upland is owned by the CBJ. Goldbelt has considered any number of development scenarios. A West Douglas Conceptual Plan was published in May 1997 and Chapter 6 of that Plan was adopted as an element of the CBJ Comprehensive Plan in 2007. This Plan encourages and facilitates the development of a New Growth Area in West Douglas when water, sewer and road infrastructure are available and adequate to serve the new development. New development should preserve shoreline and streamside areas in public ownership as open space/natural areas with public access points.

4. Unless and until municipal water and sewer services are provided to the North Douglas area, continue to allow for rural residential densities along the North Douglas Highway corridor and maintain the Resource Development land use designation for upland areas. Where municipal water and sewer service are provided, more efficient use of this land should be encouraged. Residential densities should be increased when, and where, roads, terrain, transit and other public services would provide the carrying-capacity for the additional residential population. However, the areas designated MDR but not currently provided municipal sewer service should remain in zoning designations that limit development to very low densities until municipal water and sewer service are provided and driveway access, roadway capacity, and intersection capacities and facilities serving that property meet the livability standard of a Level of Service D or better.

5. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements. Those recommendations include: (a) implement the 2002 Fish Creek Park Master Plan; (b) develop a master plan for recreation lands from Fish Creek to Point Hilda in North and West Douglas; (c) support construction of separated bicycle and pedestrian pathways along North Douglas Highway; (d) work with the North Douglas golf course developer to allow for cross country ski and walking use of the course with lighted trails for winter use; (e) develop a community park on West Douglas; (f) develop a neighborhood park in North Douglas that includes both passive and active recreation areas; (g) develop a community garden in the North Douglas area; (h) retain a trail corridor on CBJ lands beyond North Douglas; (i) consider acquisition of private land at Outer Point for public recreation use; and (j) coordinate recreational and maintenance activities at Eaglecrest.

6. Protect access to the Treadwell Ditch Trail and beach trails and support improvements to trails as recommended by Trail Mix.

7. Retain an easement for a bench road and trail corridor on CBJ lands around the perimeter of the Island (a trans-island road and trail system). As development proceeds near Peterson Creek, the CBJ should actively pursue development of a trail corridor that begins at the current end of the North Douglas Highway to the new development.

8. Prevent development within the Fish Creek Road scenic corridor, which is represented by a one-quarter mile distance from the Fish Creek Road right-of-way on each side of the road. No structures, other than utilities, shall be permitted therein. Minimize to the greatest extent practicable, intersecting driveways and other vehicular access points on Fish Creek Road from North Douglas Highway to Eaglecrest Lodge.

9. Retain Fish Creek Park as designated recreational open space/natural areas and restrict any development adjacent to the park, other than non-motorized access trails or bridges, which would adversely impact the valuable estuarine habitat and recreational use of the area.

10. On CBJ-owned lands, maintain a 200 foot stream buffer on each side of Fish Creek.
On CBJ-owned lands that are not designated for disposal in the 1999 CBJ Land Management Plan, maintain 200 foot stream buffers on each side of the following waterbodies: Peterson Creek, Eleven Mile Creek, Middle Creek, and Hilda Creek. This buffer zone or setback may be adjusted or altered

on a case-by-case basis, when a scientific analysis of the specific function(s) of the particular value(s) finds that the setback should be more, based on its functional value(s). The setback from Peterson Creek as it passes through the land included within the CBJ Totem Creek Golf Course Lease Agreement, as outlined in existing (expired) permits, may be less than suggested here if that project is proposed again, provided that the water quality of the creek is not impaired by non-native pesticides or fertilizers, sediments or other materials, and the riparian habitat of the creek is not impaired by invasive species.

11. As much as is practical and efficient, coordinate recreational and maintenance activities and shared use of facilities and equipment and coordinate management activities with the Eaglecrest Facility and programs. Many of the facilities at Eaglecrest can serve both skiers and non-skiers and both winter and off-season recreational activities and events. Shared use and year-round use of the Eaglecrest facilities and lands should be encouraged and facilitated.

12. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

13. When reviewing development proposals for Douglas Island, ensure that the site layout and circulation system configuration proposed minimizes direct vehicular access onto North Douglas Highway and does not obstruct or harm potential roadway access to an upland bench road to West Douglas or non-motorized access to a trans-island trail system, including the Treadwell Ditch Trail.

14. The West Douglas Concept Plan, Chapter 6, Land Use section has been adopted as an element of the CBJ Comprehensive Plan. Development within these New Growth Areas is subject to a master development plan to be adopted by the Assembly. Each subarea in these New Growth Areas may be planned in phases, consistent with the general guidelines in Chapter 6 of the West Douglas Concept Plan.

Subarea 9: Douglas & West Juneau (Maps M, O, & P)

Community Form: Urban in downtown Douglas and West Juneau

Rural south of downtown Douglas

NATURAL RESOURCES AND HAZARDS:

Type	*General Location*
Wildlife (Eagle nests)	8 eagle nests in Douglas and South Douglas (2006 data)
Stream and Lakeshore Corridors	Kowee, Bear, Lawson, Bullion, Ready Bullion, and Nevada Creeks
Wetlands/Tidelands	Mouth of Kowee and Lawson creeks, along the shoreline south of downtown Douglas, and on the bench above Douglas Highway.
Cultural and Historic Resources	Downtown Douglas, Treadwell mine complex, Douglas cemeteries

Table 11.9

Guidelines and Considerations for Subarea 9:

1. Provide for additional medium- to high- density residential development in areas with access to arterials and served by municipal sewer and water and adequate road and intersection capacity (to Level of Service D or better).

2. Maintain the requirement for a bridge to the transition area on upper Kowee Creek as a condition of zoning transition, to divert traffic away from Cordova Street. Work with property owners on both sides of the creek to finance and construct the appropriate bridge design, through a Local Improvement District or other similar financial mechanism.

3. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements. Those recommendations include: (a) develop a plan for the interpretation of the Treadwell Mine area from the parking lot to the cave-in; (b) complete a Master Plan for Savikko Park; (c) retain neighborhood access to Mt. Jumbo/Bradley trail; (d) reserve the meadows behind Crow Hill for cross country skiing; (e) develop Homestead Park as a beach access site; (f) develop the Treadwell Ditch Trail for a variety of uses.

4. Preserve publicly-owned, undeveloped shoreline areas for public open space/natural areas.

5. Assure public access to Treadwell Ditch, Dan Moller and Mt. Jumbo/Bradley trails and, where appropriate, to area beaches.

6. A Marine Mixed Use District designation is shown for a portion of downtown Douglas. This designation reflects the current pattern of commercial development and will allow higher density residential development. The zoning for this area should reflect this land use designation.
   The commercial core of downtown Douglas includes an auto repair shop, gas/convenience store, bars, restaurants and personal service shops. Major public buildings include the Post Office, Douglas Fire Station/Library, Gastineau Elementary School, Mt. Jumbo Gym/service center, and the historic Mayflower School. The Perseverance Theater is a significant and unique cultural facility.

7. There are several parcels of private land that could be further developed into multifamily structures as well as some CBJ-owned parcels above Crow Hill that should be developed into medium-to-high density, low- to moderate- income affordable housing when sewer and roadway capacities can adequately (LOS D or better) serve the new development.

8. Future development in North Douglas, West Juneau or downtown Douglas will require improvements to the Tenth Street and Egan Drive intersection and may require additional traffic capacity on the Juneau-Douglas Bridge. These two congestion points limit additional residential development on Douglas Island and impede the CBJ's progress in promoting and facilitating the construction of affordable housing.
   The Cordova Street and Douglas Highway intersection has been the subject of many studies. These studies have documented the obvious: A problem currently exists during the weekday morning peak travel period for motorists seeking to turn left onto Douglas Highway from Cordova Street. The traffic problem is likely to get worse as West Juneau is further developed. The Juneau-Douglas Bridge has limited capacity for a number of reasons. A traffic circle was installed at the North Douglas Highway terminus of the Juneau-Douglas Bridge; this increased the capacity and lessened congestion from Cordova Street and southbound traffic from north of the Bridge area, however, the design capacity at the Tenth Street and Egan Drive intersection continues to function at unacceptable congested Levels of Service E and F in the peak week day morning periods. The CBJ should work with ADOT&PF to upgrade the Tenth Street and Egan Drive intersection as a top priority.

9. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

10. The Treadwell historic area and trail, although a significant local resource for heritage touris should be protected from overuse.

11. Conduct an area plan or neighborhood plan for the downtown Douglas area that would address residential and non-residential uses in the vicinity of the harbor and town center with the goal of creating a Marine Mixed Use, transit and pedestrian-oriented community. Marine Mixed Use land uses could include: Water-related recreation, eco-tourism, commercial fisheries, sport fisheries, marine-related research and aquaculture, and other private and public use of the waters and shoreline; inland areas of housing, neighborhood-commercial needs, transportation systems, habitat protection, educational facilities, careful urban design, and viewscape protection measures. This study should address the needs of and should include the participation of all stakeholders including property owners, residents, business operators, the Alaska Department of Transportation and Public Facilities, and all relevant CBJ Departments and Divisions.

Watersheds (Watershed, Scenic Corridor/Viewshed, & Hazard Area Maps 1 & 2)

Community Form: Predominantly Rural, with some Scenic Corridors/Viewsheds and Hazards Areas in Urban and Suburban areas.

Guidelines and Considerations for Watersheds:

1. Protect watershed areas to assure an adequate supply of clean, safe drinking water.

2. Identify and protect historic resources.

3. Maintain the Watershed Control and Wellhead Protection Program–Gold Creek Source (1994) as well as the 1994 Last Chance Basin Land Management Plan (LCBLMP).

4. The Gold Creek watershed is one of two water sources supplying the CBJ's drinking water. The protection of the water supply in the watershed is the highest priority. Therefore, only those activities that can demonstrate compliance with watershed protection objectives should be allowed in the Basin. Any permits issued for use of CBJ land above the wellheads should contain conditions to assure protection of the watershed.

5. The 1994 update of the LCBLMP, a component of the Comprehensive Plan, contains the following objectives for land use activities in the Last Chance Basin:

    A. Protect the high quality of the municipal water supply obtained from Last Chance Basin's vital water resource;

    B. Encourage and enhance resident and visitor appreciation of Last Chance Basin's rich historical heritage;

    C. Maintain the wild, natural, and scenic qualities of Last Chance Basin; and

    D. Encourage and enhance resident and visitor enjoyment of casual recreational opportunities in Last Chance Basin. Consider the objectives of the plan when reviewing capital improvements or permit applications affecting the watershed.

6. There is increasing pressure to operate tourist related services in Last Chance Basin and the Gold Creek watershed. The CBJ must work toward controlling tourist-related services in the Last Chance Basin to protect the watershed, transportation facilities and the quiet and privacy of the abutting residential neighborhoods. Therefore, the CBJ should:

    A. Monitor the impacts of tourism to the area. The impacts to water quality and of the increased traffic on Basin Road should be analyzed in determining the carrying capacity of the area;

    B. Use a permit and fee system for tourist use of CBJ property that would support required maintenance of road, trails and historic resources and enforcement activities;

C. Allow small-scale commercial activity on a case-by-case basis under a pe
structure, provided that no permanent structures or physical facilities are provided.

7. The historic buildings in Last Chance Basin are a valuable resource and offer a glimpse into the past development of the community. Therefore the CBJ should (a) maintain an awareness that significant historic buildings and artifacts in the Basin will further deteriorate unless they are maintained; (b) devise an acceptable form of access so that a historic interpretive center may be developed; motor vehicle access should avoid the use of Basin Road; (c) encourage and assist, if possible, interim efforts of the Gastineau Channel Historical Society to maintain and stabilize historic structures and artifacts; and (d) restore vehicular access for emergency access to the site of the historic mining buildings at the Compressor Building level for the purpose of maintaining and preserving these historic facilities while ensuring the protection of the watershed from vehicular-related pollutants to the soil or groundwater.

8. The existing Gold Panning operation is allowed to operate under the provisions of the LCBLMP. The operator should, however, be encouraged to ultimately relocate this operation out of the Gold Creek wellhead recharge area.

9. Vandalism and illegal dumping has increasingly become a problem in Last Chance Basin. In the winter, a severe avalanche hazard exists. Therefore, prohibit vehicular access to the Basin between midnight and 7am in the summer, and prevent vehicular access altogether in the winter. Signs should be posted informing people of the hours of access and that the gate will be locked during certain hours.

10. The Parks and Recreation Comprehensive Plan, Chapter 8, recommends a number of parks, trail, community garden and stream corridor improvements. Those recommendations include: (a) retain the Last Chance Basin in its undeveloped condition and allow for year-round recreation use where avalanche hazards are not present; and (b) assist with the stabilization of historic buildings in Last Chance Basin.

11. Identify historic and cultural resources within the subarea. Projects that may impact historic resources identified within this subarea are to be reviewed by the Historic Resources Advisory Committee (HRAC) prior to issuance of a permit. Where new historic or cultural resources are discovered or identified, the Juneau-Douglas City Museum should be contacted immediately for documentation and technical assistance toward preservation and/or curating of the resource. The demolition or removal of historic resources should be avoided and should only occur when no other option for its preservation or relocation to a suitable site exists.

CHAPTER 12
PUBLIC AND PRIVATE UTILITIES AND FACILITIES

Public facilities - public buildings, water service, sanitary sewer services, earth retention structures, waste reduction, recycling and disposal efforts, roads and rights-of-way, telecommunications systems, and storm drainage systems--are not only important to the health, safety and economic well-being of the CBJ, but they also strongly influence and even guide future growth patterns. The development envisioned in this Comprehensive Plan, particularly for new affordable housing and export industries, cannot be realized without the availability of public facilities and services on a timely and efficient basis.

There was rapid growth during the 1982-86 period, largely in the Mendenhall Valley but also in the North Douglas and Lemon Creek areas. In 1987, growth virtually stopped due to a dramatic contraction of the state budget. However, since the late 1980's growth has continued, gathering momentum each year so that by 1995, residential and commercial construction was again robust. Despite flattening of the state budget, this level of construction activity continued through the 1990s due to the presence of the state capital in Juneau, mining activity and the expansion of tourism. A six-year Capital Improvement Program (CIP) has been a major tool in determining the priority, timing and funding of needed facilities. The CIP is an important tool in funding projects that implement the recommendations in the Comprehensive Plan.

Provision of Public Utilities and Facilities

The CBJ government generally funds improvements to the infrastructure through user fees, special assessment districts such as the Local Improvement Districts (LIDs) created to fund sewer service extensions, and sales tax initiatives passed by the voters. The community also receives grants from the State of Alaska and the federal government, but these latter sources continue to diminish and cannot be relied upon to fund major infrastructure projects. This reinforces the need for careful planning and creative "layering" of financial resources to support the construction, operation and maintenance of public facilities and infrastructure. Public/private partnerships, such as the LIDs, development impact fees, "turnkey" developments (private sector builds a facility and CBJ government enters into a long-term lease-to-own agreement) and joint ventures can provide needed and desired public improvements and facilities.

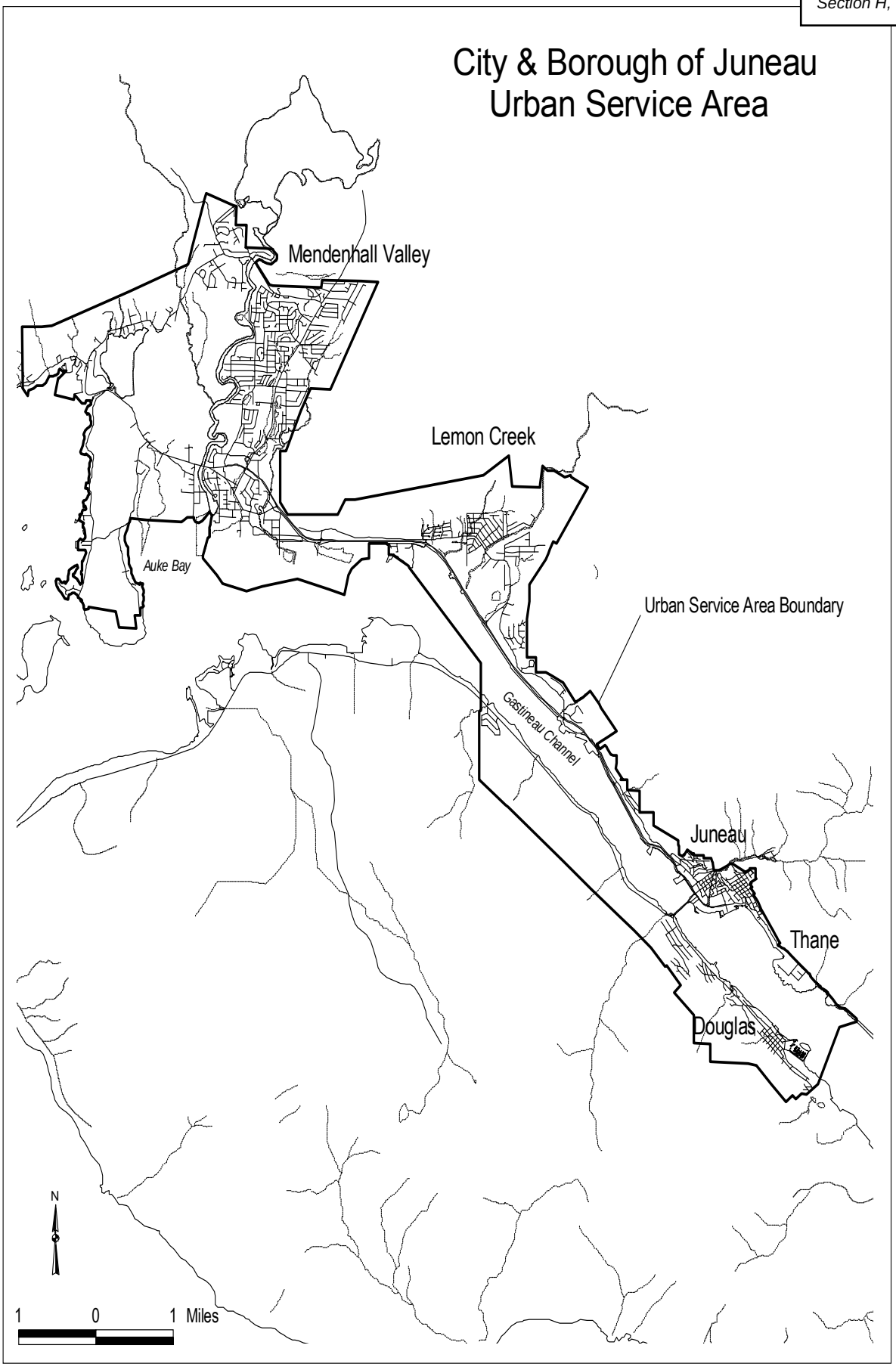
Together with the transportation network and private utility and communications systems, public services and facilities provide the community's "urban glue" and require efficient and timely provision. A full complement of services and facilities to promote the public's health, safety and quality of life is needed to provide adequately for the density and intensity of land uses envisioned in the Urban Service Area and proposed New Growth Areas; this is deemed an adequate "carrying capacity" for these services, and neighborhoods should not be developed beyond the carrying capacity of public infrastructure, utilities and services. This level of service is not necessary in rural areas nor can it be provided there in an economically efficient manner. To allocate its scarce resources efficiently, the CBJ government must make public investments that meet the greatest need and serve the greatest number of residents; this requires compact development.

POLICY 12.1. TO PLAN FOR THE TIMELY AND EFFICIENT PROVISION OF AN APPROPRIATE LE OF PUBLIC FACILITIES AND SERVICES IN ALL DEVELOPED AND DEVELOPING AREAS WITHIN THE URBAN SERVICE AREA.

Standard Operating Procedures

12.1 - SOP1 Maintain an Urban Service Area boundary that defines the limits within which the full range of urban services, such as municipal water and sewer, will be provided. Such municipal services are not to be provided elsewhere. The Urban Service Area boundary is delineated in the Comprehensive Plan. [See following page]

12.1 - SOP2 Utilize the six-year Capital Improvement Program (CIP) that includes a list of projects to be funded during the coming fiscal year as well as those recommended for consideration during the subsequent five years. Annually review all previously unfunded projects and new projects for relevance and consistency with this Plan and extend the CIP an additional year.



Map 12.1

CBJ Urban Service Area Boundary Map

PUBLIC WATER, SEWER, STORM DRAINAGE, AND RETAINING WALLS

To support the nature and density of development envisioned in the Urban Service Area, enhance the quality of life, promote public health, and protect the environment, the CBJ should provide adequate water, sewer, storm drainage, roads and earth retention facilities therein.

Water

Fresh, potable water is in short supply elsewhere in the world. On our planet, 97% of all water is salt water. Drinking water supply is shrinking worldwide, distribution facilities are aging and, in many places, are failing, and the price of potable water will increase over time in the global market. In some communities, potable water is more valuable than gold or oil. Juneau's position at the foot of an immense icefield and in the middle of a rain forest is fortunate, a blessing. Our neighbor city, Sitka, has found a way to market its high quality fresh water and share it with the world. We, as a community, should take great care of our resource, should capture and store it before it flows into the sea without harming riparian or marine habitat, should preserve it for future generations, and, perhaps, can even share it with other communities who are not located so fortuitously near fresh, clean water.

Our CBJ water capture, storage and distribution system is a valued utility and we should take great care in managing our clean, high quality water resource and conserve this resource whenever possible.

In addition to long established municipal water systems in downtown Juneau and Douglas, the area-wide water system serves the Mendenhall Valley, Lemon Creek, Auke Bay to Indian Point, and Douglas Island from the community of Douglas to the Forest Service Boundary near Fish Creek. The system also serves the entire east Mendenhall Valley, Auke Bay, and extends out Glacier Highway to serve the Lena Loop residential area. The water system as designed and installed is not intended to support large demand industrial users. The water supply is not adequate and the distribution system is not adequate for these types of users without substantial additional investment. Those types of industrial uses, such as fish and food processing, are encouraged and should be urged to maximize water conservation and reuse in their operations.

The water system as installed provides sufficient water flows and reservoir capacities in the majority of the community to qualify the community for an IS0 rating of five; the best possible rating is a Class 1, the worst is a Class 10 (unprotected). Prior to these improvements in the system, only Juneau and West Juneau could qualify for this rating. The CBJ area-wide water system receives its water from two sources, the Gold Creek Basin/Last Chance Basin and Salmon Creek Reservoir. This Plan places land use protections on watersheds that could serve the Echo Cove and North Douglas New Growth Areas as well as future potable water supplies for the Mendenhall Valley.

Extension of public water to remote locations with correspondingly lower residential density becomes extremely expensive on a per-service basis and should not be pursued.

Sewer

Due to slope and soil conditions, many areas not served by sewer are marginally suitable for on-site septic systems. Due to a lack of resources, the Alaska Department of Environmental Conservation (DEC), which is responsible for local enforcement, does not adequately monitor the installation and maintenance of septic systems.

To prevent potentially serious health problems, sewer service should be available in all new urban development areas. In areas within the Urban Service Area, extension of the existing municipal system is the most economically and technically feasible alternative. In New Growth Areas, located some distance from municipal systems, a packaged or community-wide sewage treatment system would be appropriate. In the early 90's, and at great expense to the CBJ, sewer was extended to the upper west Mendenhall Valley to serve several hundred residences that had been using on-lot disposal with high rates of failure; this was repeated in North Douglas when septic systems failed and soiled the shoreline. Even with homeowners paying into a Local Improvement District, taxpayer subsidies to extend sewer service to outlying areas can represent 80 percent of the costs of sewer line extensions and connections; this should not be repeated.

The Mendenhall Valley Wastewater Treatment Plant was substantially expanded in the 1980's and now has the capacity to treat wastewater from the entire valley area, east and west, as well as the area between the valley and the service area of the Juneau-Douglas Wastewater Treatment Plant located on the Rock Dump. In the early

1990's, a sewage sludge incinerator was completed. This facility reduces sludge from both of the plants to inert ash that is easily disposed of and eliminates the need to place the much higher volume of unburned hazardous sludge in landfills.

All potential New Growth Areas, as identified in this Plan, may be most feasibly served through the use of self-contained water, sewer and storm drainage facilities. To help decide whether these should be publicly or privately owned and maintained, the CBJ should first determine its future obligation with regard to the development of these areas through the specific New Growth Area Master Planning process and adoption of a specific development plan and timeline.

The Urban Service Area boundary (USAB) indicates the extent to which urban services are to be extended and is shown on the Comprehensive Plan Land Use Maps. The CBJ water system actually extends far beyond the boundary in North Douglas and out Glacier Highway at Auke Nu Cove. As noted above, this was the result of an electoral commitment and represents a deviation from the USAB concept. As the cost of providing these services continues to increase with both inflation and lower service density, it is more important than ever to commit firmly to the USAB concept and resist extension of urban services beyond the boundary.

POLICY 12.2. TO EXTEND PUBLIC WATER, SEWER, STORM DRAINAGE, AND EARTH RETENTION FACILITIES TO ALL AREAS WITHIN THE URBAN SERVICE AREA.

Standard Operating Procedure

12.2 - SOP1 Coordinate the provision of public services and facilities to all developed lands within the USAB. Assist private developers outside the USAB to identify state and private sources of sanitary sewer technical information and funding, particularly for New Growth Areas.

Implementing Actions

12.2 - IA1 Amend the Land Use Code to specify that no permanent urban service infrastructure, specifically sewer and storm drainage, shall be provided by the CBJ in any location beyond the USAB, and that the CBJ water system will not be extended beyond its 2008 configuration except to serve lands within the USAB. Extensions should only be considered after a decision has been made to expand the Urban Service Area boundary as a Comprehensive Plan Land Use Map amendment.

12.2 - IA2 Consider the connection of the Mendenhall and Auke Bay wastewater treatment plants as a top priority, together with extending sewer service to developed lands within the USAB not presently serviced by CBJ sewer.

12.2 - IA3 Urge the Alaska Department of Environmental Conservation (DEC) to adequately monitor on-site sewage disposal systems in the CBJ. Provide assistance to the DEC program to identify and monitor existing septic systems or to transfer this function to the CBJ with sufficient resources to enable an adequate transition.

12.2 - IA4 Develop plans for overall storm drainage systems, including public provision of a central drainage system within the USAB, and storm/sanitary sewer separation.

12.2 - IA5 Develop a water conservation plan for CBJ utility customers.

Electrical Generation and Distribution

With the scarcity of non-renewable fossil fuel, particularly "cheap oil," the CBJ government and Juneau's electrical energy utility, the Alaska Electric Light & Power Company (AEL&P), must plan for the production of energy locally. The community is well-situated to expand its hydroelectric generating system, as well as investigating potential other renewable energy sources such as wind, tidal and biomass. A detailed discussion of energy use, conservation and management can be found in Chapter 6 of this Plan. This section is specifically aimed at the electrical system for Juneau and is included in this subject section because the system is essential for modern life. Nearly all of the community's electricity is generated at hydro-electric plants by AEL&P. Eighty percent of the electricity is provided from the federally-constructed Snettisham Hydroelectric Facility located 28 air miles southeast of Juneau at the Speel Arm fjord and Crater and Long alpine lakes. AEL&P also generates electricity from hydro-facilities on Sal

Creek, Annex Creek, Gold Creek, and at Lake Dorothy. AEL&P also maintains diesel generators and jet generators as back-up facilities.

POLICY 12.3. TO ENCOURAGE THE PROVISION OF AN ADEQUATE SUPPLY OF HYDROELECTRIC ENERGY AND OTHER RENEWABLE SOURCE ELECTRICAL GENERATING FACILITIES TO PROVIDE FOR THE CONTINUED GROWTH AND DEVELOPMENT OF THE COMMUNITY.

Standard Operating Procedure

12.3 - SOP1 Encourage the continued development of clean, efficient hydro- and other renewable-source electrical generating facilities to provide for future community needs and to reduce dependence upon the use of fossil fuels for energy.

Development Guideline

12.3 - DG1 In reviewing permits for businesses that use heavy energy loads, seek implementation of Best Management Practices that conserve and/or re-use energy loads, minimize the use of fossil fuels, and maximize renewable energy sources in its operations.

Implementing Action

12.3 - IA1 Seek to convert CBJ transport vehicles and stationary motors from fossil fuel systems to renewable energy systems.

12.3 - IA2 Amend the Title 49 Land Use Code to allow as-of-right the installation of renewable-source electrical generating facilities to residential and commercial structures, provided that they do not obstruct sunlight to adjacent properties or generate unacceptable noise.

12.3 - IA3 Consider creation of an ordinance prohibiting covenants and restrictions on private developments that infringe on the ability of property owners to install renewable energy source infrastructure that is appropriately scaled for the development.

Waste Management

Management of solid and household hazardous waste is an essential community service. Assurance that waste management, including disposal, occurs in an aesthetic, safe, convenient, cost-effective, and environmentally sound manner is critical to protect the health, safety, and environment for our citizens. Local government typically provides solid waste management services, directly with its own personnel, indirectly with one or more contractors, or through a combination of both public and private service provision. In Juneau, curbside pickup of solid waste and recyclables as well as landfill operations are conducted entirely by the private sector, while source separated drop-off recycling, household hazardous waste collection and disposal, and junked vehicle disposal are currently conducted by private firms.Plans for future waste management in Juneau call for developing a single household hazardous waste collection facility that is open to the public on a more regular basis than is currently available, as well as drop boxes for recycling and other changes that will make recycling more accessible to Juneau residents.

Heightened concern about the negative environmental impacts of solid waste landfills have resulted in more stringent federal standards for siting, operating, closing, remediating, and monitoring of landfills. This has resulted in greater care and costs in managing existing landfills and constructing new ones. Nationwide, there is an emphasis on developing integrated waste management systems in which waste reduction, reuse and recycling are preferred over traditional waste disposal options of incineration and landfilling. This is the approach pursued by the CBJ in the preparation of the *Final Solid Waste Management Strategy for the City and Borough of Juneau* in 2007 and the Solid Waste Management Program Implementation of 2009. Of particular concern by the public are programs that address waste stream reduction and curbside pick-up of recyclable material. In 2012, curbside pickup of recyclable materials was initiated by the private sector. This program will certainly affect the solid waste stream in Juneau, but the full impact of this new service will need to be evaluated over time.

Waste Reduction, Reuse and Recycling

It is in the long-term interest of all people in Juneau to minimize waste disposal and to recycle used materials as a part of local efforts to conserve natural resources. Recycling, where appropriate, will lead to the more efficient and economical use of resources and will lessen the impact on the environment by decreasing the need for the disposal of materials. It is recognized that since Juneau is located far from major recycling markets, it may not be energy efficient to recycle some classes of materials at the present time. Therefore, reduced resource use and careful purchasing practices are especially important. Direct, immediate or short-term costs should not be the sole consideration for CBJ government support of programs and policies for waste reduction, reuse and recycling. Instead, related indirect, future, or long-term costs should also be considered, such as the costs of landfill operation, closure, and post-closure. The CBJ government understands that effective efforts towards materials conservation, reuse, and recycling, as well as energy conservation, necessarily involve close and on-going communication, coordination, and cooperation between the public, private and non-profit sectors. While some programs may not be cost effective in Juneau alone, the CBJ government could work with regional entities such as the Southeast Regional Solid Waste Authority, that are currently developing plans for a central facility for the region. It would also benefit the Juneau community for the CBJ government to work with other local and regional entities to develop inter-local agreements to increase volumes of recyclables shipped to markets.

POLICY 12.4. TO FACILITATE THE REDUCTION OF WASTE MATERIALS GENERATED AND DISPOSED BY HOUSEHOLDS AND BUSINESSES THROUGH PROMOTION OF AN AGGRESSIVE SOLID WASTE DIVERSION PROGRAM INCLUDING ACTIVITIES FACILITATING WASTE PREVENTION, REUSE AND RECYCLING.

Development Guideline

12.4 - DG1 When reviewing building or use permits for major residential and non-residential developments, ensure that the design of the project incorporates adequate space and facilities in appropriate locations to facilitate separation of recyclable waste materials and access for the pick-up and transfer of those materials to appropriate recycling centers.

Implementing Actions

12.4 - IA1 Implement the *Final Solid Waste Management Strategy for the City and Borough of Juneau*, as adopted on November 29, 2007 and amended January 7, 2008.

12.4 - IA2 Require companies that do business with the CBJ to implement waste reduction and recycling Best Management Practices (BMPs); these BMPs should be required as qualifications for CBJ purchasing procedures.

12.4 - IA3 Create incentives for businesses that implement a waste reduction plan.

12.4 - IA4 Consider community service programs, including halfway house correctional programs, as potential human resources for recycling and waste reduction efforts, such as for the sorting of recyclables at a recycling center.

12.4 - IA5 Facilitate identification and permitting of a “stump dump” landfill site for near-term use by residential and non-residential builders.

12.4 – IA6 Work with the cruise industry and other industries creating large amounts of solid waste to reduce the amount of waste entering Juneau’s landfill and to increase the amount of solid waste that is recycled.

POLICY 12.5. TO PROMOTE EFFICIENT, SAFE, CONVENIENT, COST—EFFECTIVE AND ENVIRONMENTALLY—SOUND METHODS FOR THE DISPOSAL OF SOLID AND HAZARDOUS WASTE.

Development Guideline

12.5 - DG1 When reviewing building or use permits for the areas around the candidate landfill sites identified in the October 1993 *Technical Reconnaissance Study for New Landfill Site Selection*, be cognizant of the on- and off-site impacts that could be generated by landfill operations at those sites.

Implementing Actions

12.5 - IA1 Implement the *Final Solid Waste Management Strategy for the City and Borough of Juneau*, as adopted on November 29, 2007 and amended January 7, 2008.

12.5 - IA2 Identify on the Comprehensive Plan Land Use Maps new locations suitable for burial of human and animal remains in a way that does not consume large land areas. Such new sites may include crematoria and publicly-accessible places to honor loved ones with plaques and similar features, rather than the location of buried remains or stored ashes.

12.5 - IA3 Work with regional organizations to develop a regional solid waste authority to deal with solid waste issues region-wide.

POLICY 12.6. TO ENCOURAGE WASTE REDUCTION, REUSE AND RECYCLING ACTIVITIES THAT HAVE POSITIVE ECONOMIC AND/OR ENVIRONMENTAL BENEFITS.

Implementing Actions

12.6 - IA1 Implement the *Final Solid Waste Management Strategy for the City and Borough of Juneau*, as adopted on November 29, 2007 and amended January 7, 2008.

12.6 - IA2 Coordinate/cooperate with villages, towns, municipalities, private companies and non-profit organizations within the region on solid waste management programs.

Hazardous Materials

Federal law requires information-sharing regarding extremely hazardous material. This law is known as the Emergency Planning and Community Right-to-Know Act. It is intended to encourage and support emergency planning efforts at the state and local level and to provide communities with information concerning potential chemical hazards. In addition, the federal government is required to identify and investigate potential hazardous waste sites within the community and enforce cleanup if the existing materials are considered hazardous.

In the early 1990's, municipalities were required to take responsibility for household hazardous wastes. In September of 1992, an assessment for disposal of household hazardous wastes was added to the city's utility bills. At present, the household hazardous waste disposal program offers seven collection events annually, with plans for expansion of the service to three days each week under negotiation.

There is clearly a local responsibility to be aware of the location, nature, and potential effects of hazardous materials and to minimize the possibility of injury, death and property damage from the inappropriate storage, use, disposal, or release of such materials.

POLICY 12.7. TO ASSIST IN THE IDENTIFICATION AND MITIGATION OF IMPACTS ASSOCIATED WITH HAZARDOUS MATERIALS.

Standard Operating Procedures

12.7 - SOP1 Cooperate with state and federal agencies in the investigation of hazardous waste sites.

12.7 - SOP2 Working in conjunction with enforcement agencies such as the federal Drug Enforcement Agency (DEA), the Alaska State Troopers, and the Juneau Police Department, provide managed hazardous and pharmaceutical waste disposal opportunities.

12.7 - SOP3 Provide information to the public regarding managed hazardous waste disposal opportunities.

Development Guideline

12.7 - DG1 When applicable, require safe, alternative (off-site) siting of more than a weekly supply of hazardous materials for businesses, and/or a Best Management Plan with appropriate mitigation measures in the event of a failure of these measures when approving permits for new development.

Implementing Actions

12.7 - IA1 Collect, map on the GIS system, and assess data on the type, amount and location of hazardous materials in the community. This information is to be made available to emergency service personnel for use in developing proper care and storage Best Management Practices for each hazardous materials user, and in planning and implementing an emergency response program for each site.

12.7 - IA2 Consider adopting an ordinance to control the transportation of explosives and ammunition through congested areas of the borough, particularly downtown Juneau, and to limit the time during which such materials may be transported in order to minimize the risk to visitors to and residents of Juneau posed by such materials.

Litter and Junk

The general CBJ government activity of devising and enforcing rules against litter and inappropriate stockpiling of junk has been gathered under the program name "Junk Busters." The program embraces the efforts of the Community Development Department, the Police Department and work by associated contractors and organizations. Television, radio and newspaper advertisements have been developed to promote understanding of litter laws, encourage participation toward solving litter-related problems, and to let the public know what to do if there is a problem. A Junk Busters hotline was established in 1994 that provides three services: Submittal of litter and junk complaints 24 hours a day; a recorded message about current recycling opportunities available in the community; and recorded information about household hazardous waste and waste oil disposal.

Litter Free, Inc. is a non-profit organization with a broad spectrum of volunteers from the community. The CBJ Assembly has provided them with financial support to aid their efforts toward coordinating volunteer and non-profit organization cleanups of public areas in borough. In addition, the CBJ government assists in the annual spring cleanup sponsored by Litter Free, Inc.

Another component of the Junk Busters program addresses illegal dumping. Illegal dumping on public land is reported to CBJ, usually through either the Juneau Police Department or the Parks & Recreation Department, and an investigation of violators is initiated. If investigators are unable to find the culprits or unable to get them to clean up, and when all other methods have failed, CBJ agencies clean up the property and, if the violation occurs on private property, recovers the cost through a property tax lien. In 2012, the Parks & Recreation Department began using video surveillance cameras at popular dump sites to assist in identifying dumpers and holding them accountable for their actions.

Success in these efforts can be defined in two stages. The first is evidenced by the large amounts of refuse being gathered and properly disposed represents the cleanup of both current and long-standing litter and junk problems. The second is demonstrated by a history of steadily reduced amounts of material that has to be gathered, indicating that the community is making progress toward the goal of preventing litter and junk in the first place.

POLICY 12.8. TO CARRY OUT AND IMPROVE PROGRAMS THAT WILL BOTH REDUCE AND ELIM LITTERING AND ACCUMULATION OF JUNK WITHIN THE BOROUGH AS WELL AS CLEAN UP SUCH MATERIAL WHEN IT IS FOUND.

Standard Operating Procedures

12.8 - SOP1 Support a marine cleanup program, including community awareness to discourage use of disposable plastics. Assist the commercial fishing industry in establishing a fishing net recycling program.

12.8 - SOP2 Support non-profit, anti-litter organizations such as Litter Free, Inc. to organize and coordinate community clean up events and standard operating procedures.

12.8 - SOP3 Update and improve litter and zoning ordinances that will result in improved community appearance.

12.8 - SOP4 Provide information to the public regarding recycling opportunities and the use of recycled or recyclable materials such as cloth shopping bags instead of plastic ones.

Implementing Actions

12.8 - IA1 The CBJ should implement the *Final Solid Waste Management Strategy for the City and Borough of Juneau*, as adopted on November 29, 2007 and amended January 7, 2008.

12.8 - IA2 Revise the Land Use Code to limit the number of unlicensed or inoperative vehicles allowed on residential property.

12.8 - IA3 Investigate, with the business community, a cost effective method for disposal of recyclable materials.

12.8 - IA4 Evaluate the need to provide additional facilities for waste oil disposal.

Rights-of-Way and Roads

Rights-of-Way serve as the backbone of the entire built environment, and are the routes that all other urban services "follow" in the community. As they are used for travel by private car, public transportation, bicycle, or by foot, as well as serving as the routes followed by electrical distribution systems, water lines, and the sewer system, public Rights-of-Way (ROWs) must accommodate a wide variety of uses that often conflict with one another. Construction of roads, or even of driveways, in ROWs must be accomplished with great care if the improvements are to stand the test of time and to serve the public's needs for access and the provision of urban services. Once constructed, ROWs must be maintained so as to enable these many uses to co-exist, and it is critical that ROWs be protected from inappropriate or constricting development.

Even parking, a use that is typically associated with roads, can have detrimental effects on the functionality of some ROWs when it is not carefully designed or managed. On-street parking serves an undeniable purpose, and is appropriate where small lot sizes, historical development patterns, or steep topography prevent adequate off-street parking from being provided for adjacent uses. In other neighborhoods, on-street parking unduly restricts sight distance and can negatively impact the ability of emergency services vehicles to reach destinations in a timely manner. Where on-street parking exists, conversion of public on-street spaces to driveway curb cuts and private off-street parking spaces privatizes the benefit of the parking space and does not serve the public interest. Similarly, requests to restrict public on-street parking spaces to permitted accessible vehicles or short-term loading zones have impacts throughout the entire neighboring road system, and must be carefully considered.

POLICY 12.9. TO REQUIRE IMPROVEMENTS TO RIGHTS-OF-WAY TO MEET MINIMUM S FOR PUBLIC SAFETY AND MAINTENANCE, AND TO ENSURE THAT EXISTING RIGHTS-OF-WAY ARE MAINTAINED AND PROTECTED FROM ENCROACHMENT SO AS TO FACILITATE THEIR USE IN PROVIDING ACCESS AND THE PROVISION OF URBAN SERVICES.

Standard Operating Procedures

12.9 - SOP1 Protect CBJ-owned Rights-of-Way from encroachment by fences, walls, buildings, garbage enclosures, and other private infrastructure that could interfere with road maintenance or snow removal.

12.9 - SOP2 Encourage mechanisms to promote removal of snow by private property owners from, and to otherwise maintain, sidewalks adjacent to their property; these mechanisms may include prohibitions against disposing of snow by placing it within public Rights-of-Way and drainage swales.

12.9 – SOP3 Maintain restrictions on parking or storing vehicles, including boats, trailers, recreational vehicles, snow machines, building materials, etc. within public Rights-of-Way. Education of and cooperation with the public are critical to the success of these restrictions.

12.9 – SOP4 Educate the public regarding requirements for property owners to maintain landscaping, fences, and other structures so as to ensure that traffic control devices (e.g., stop signs) are visible, sight distances are not reduced, and snow removal operations are not restricted. Cooperate with property owners to ensure compliance.

12.9 – SOP5 Require all new mailboxes to comply with locational and design requirements.

Development Guideline

12.9 - DG1 Landscaping in Rights-of-Way should be hardy enough to withstand snow storage, or located so as to not interfere with snow storage and removal; this does not preclude the installation of street trees or planted medians, but ensures that their location and the species selected for planting can withstand critical snow storage and removal activities.

Implementing Actions

12.9 - IA1 Adopt ordinances or regulations addressing existing encroachments by fences, walls, garbage enclosures, and other private infrastructure that interferes with road maintenance or snow removal.

12.9 – IA2 Adopt ordinances or regulations to require that new residential developments utilize clustered or grouped mailboxes instead of individual mailbox supports at each residence, and to result in the conversion of existing individual mailboxes to gang mailboxes over time.

12.9 – IA3 Prohibit the disposal of yard waste or other organic matter in drainage routes.

12.9 – IA4 Require drainage easements allowing CBJ staff access to maintain drainage routes in new developments.

POLICY 12.10. TO MANAGE ON-STREET PARKING RESOURCES AS AN INTEGRAL PART OF THE ROADWAY SYSTEM THAT MUST BE CONSIDERED IN THE CONTEXT OF TRANSPORTATION, ACCESS, SAFETY, AND THE MAXIMUM BENEFIT TO THE COMMUNITY.

Standard Operating Procedure

12.10 - SOP1 Consider any requests to change restrictions or management of on-street parking spaces in light of parking demand in the area, existing and proposed land uses in the area, the physical restrictions of the location, and adopted parking management policies.

12.10 – SOP2 Prohibit the conversion of existing public on-street parking to driveway curb cuts or access points to private off-street parking unless the number of public spaces removed is greatly exceeded by the number of private off-street spaces that will be accessed. Generally, public on-street parking should not be eliminated in favor of driveway access to single-family residences or duplexes, but may be warranted for larger developments with a greater parking demand.

Development Guideline

12.10 - DG1 Design roadway sections to use elements such as on-street parking, landscaping buffers, and other space outside the travelled way to protect pedestrians from the travelled way and to provide snow storage capacity.

Wireless Communications Facilities

Wireless Communications Facilities (WCFs), also commonly known as "cell phone towers" (although WCFs include many more types of facilities than just cellular phone and data equipment), are an increasingly common sight in Juneau. These facilities enable on-demand communications for residents, visitors, and emergency services, but these structures can impact views, and are perceived by some members of the community as undesirable. Federal law limits the ability of local government to regulate WCFs; many public concerns cannot be addressed in local regulations.

POLICY 12.11. TO PLAN FOR AND TO ESTABLISH LAND USE CONTROLS ON WIRELESS COMMUNICATIONS FACILITIES IN A MANNER THAT IS APPROPRIATE FOR THE COMMUNITY AND WITHIN THE PARAMETERS ESTABLISHED BY FEDERAL LAW.

Standard Operating Procedures

12.11 – SOP1 Facilitate the provision of high quality, consistent wireless communication services to residents, businesses, and visitors.

12.11 – SOP2 Avoid potential injury to persons and properties from tower failure and windstorm hazards through structural standards and setback requirements.

12.11 – SOP3 Accommodate the growing need and demand for wireless communication services.

12.11 – SOP4 Encourage coordination between suppliers and providers of wireless communication services.

12.11 – SOP5 Minimize the potential for WCFs to cause interference to other radio services.

Development Guidelines

12.11 – DG1 Encourage developers and tenants of WCF to locate them, to the extent possible, in areas where the adverse impact on the community is minimal.

12.11 – DG2 Encourage the location and co-location of WCF on existing structures to minimize the need for additional structures.

Implementing Actions

12.11 – IA1 Conduct a planning process and adopt a CBJ *Wireless Master Plan*.

12.11 – IA2 Adopt new Specified Use Provisions in the Land Use Code that provide a uniform and comprehensive framework for evaluating proposals for WCF.

12.11 – IA3 Establish standards for location, structural integrity, and compatibility with surrounding neighborhoods to minimize the impacts of WCFs on surrounding land uses.

12.11 – IA4 Establish predictable and balanced codes governing the construction and location of WCF.

12.11 – IA5 Ensure that any new local regulation or restriction on WCFs responds to the policies embodied in federal law.

12.11 – IA6 Include provisions that encourage the use of locations identified in the CBJ *Wireless Master Plan* as preferred locations for wireless communications infrastructure in any ordinance that regulates WCFs.

12.11 – IA7 Use zoning restrictions to encourage concealment technologies for new wireless communication infrastructure to lessen adverse effects to surrounding neighborhoods.

CHAPTER 13
COMMUNITY SERVICES

Police Protection

The CBJ Police Department provides full police protection for the CBJ. State Troopers are responsible for search and rescue operations and for response to complaints or offenses that occur at the Lemon Creek Correctional Institute. Violations and complaints related to State of Alaska or federal fish and game statutes are the responsibility of the Alaska Department of Public Safety.

POLICY 13.1. TO PROVIDE ADEQUATE AND EFFICIENT POLICE PROTECTION FOR THE COMMUNITY.

Standard Operating Procedures

13.1 - SOP1 Encourage and support coordination of services between state, federal, and local police.

13.1 - SOP2 Maintain strategic locations of police and fire facilities to reduce emergency response times to incident locations.

13.1 - SOP3 Maintain centralized dispatch of all emergency and essential services.

13.1 - SOP4 Improve computerized integration of JPD and CDD and other CBJ departments.

Fire Protection and Emergency Services

Fire protection is a fundamental and basic community service that is one of the first services usually provided in a community and has often been the seed from which other community services have grown. The communities that form the CBJ have a long history of volunteerism in providing fire suppression, rescue services and emergency medical care for its residents; this tradition continues to modern times.

The CBJ Capital City Fire/Rescue (CCFR) department is responsible for the prevention and extinguishment of fire, the protection of life and property against fire, the removal of fire hazards, and the provision of field emergency medical services.

CCFR has five fire stations that have all been constructed since 1979. Each station has different amounts and types of fire apparatus based upon its responsibilities. The Glacier District has the additional responsibility of airport rescue and fire-fighting. CCFR is also charged with enforcement of the Fire Code and does so in a review of building permit applications and inspection of construction coordinated with the Community Development Department. The CBJ contracts with the U.S. Forest Service to suppress grass fires. The Insurance Services Office granted the CBJ Fire Department a protection rating of 5 with an overall Fire Department and combined dispatch capabilities rating of Class 4 for the CBJ.

CCFR provides emergency medical services at the advance life support level. Medical units are stationed at the Juneau and Glacier stations. Paid staff are trained at the paramedic advanced cardiac life support level; volunteer Emergency Medical Technicians (EMTs) are also utilized as an important part of the emergency medical system. Rescue squads are staffed by career and volunteer members. CBJ staff from various departments are trained to form a CBJ Crisis Management Team (CMT). The role of the CMT is to manage a major incident that exceeds the capabilities of the Fire Department and coordinate command and control. The team functions within the scope of the Incident Command System.

POLICY 13.2. TO PROVIDE ADEQUATE AND EFFICIENT FIRE PROTECTION AND FIELD EMERGI MEDICAL CARE FOR ALL. IT IS FURTHER THE POLICY OF THE CBJ TO MAINTAIN AN INCIDENT RESPONSE ORGANIZATION TO EFFECTIVELY RESPOND TO LARGE-SCALE EVENTS AND DISASTERS.

Standard Operating Procedures

13.2 - SOP1 Provide standardized training, procedures, equipment and response to all fire stations. Enhance training and provide equipment for volunteer teams.

13.2 - SOP2 Determine adequate and efficient fire protection by conducting fire hazard analyses, fire flow requirement analyses, and resource requirements.

13.2 - SOP3 Review and, when appropriate, recommend changes in the Fire Code to reduce fire hazards and to properly store and dispose of hazardous materials to reduce life and property loss.

13.2 - SOP4 Improve and implement a hazardous materials safe storage and disposal, mitigation and response plan.

13.2 - SOP5 Coordinate with the CBJ Emergency Services Manager to plan for prevention of and, when necessary, adequate response to disasters and major incidents.

Implementing Actions

13.2 - IA1 Develop a plan through the appointed steering committee for the Southeast Regional Fire Training Center to provide extended training programs for Juneau and the southeast region.

13.2 - IA2 Complete preparation of a plan, staff a Level A response team and equipment acquisition for emergency response to a hazardous materials incident, per the federal Community Right to Know Act.

13.2 - IA3 Develop a plan to sprinkle critical government or public buildings.

Medical and Social Services

Juneau is a caring community and through skilled professionals and volunteers provides high-quality medical and social services to local and regional residents and visitors. The municipally-owned Bartlett Regional Hospital provides critical care, specialty-medical care, and mental health and chemical dependency treatment centers. Bartlett Regional Hospital, although municipally-owned, is operated by an independent management firm. The Hospital's "Project 2005" capital improvement program as enhanced its capabilities in serving the medical needs of northern Southeast Alaska; by late 2012, this capital improvement program was almost entirely complete.

The CBJ government also provides funding for an array of non-profit social service agencies. These programs target youth in crisis, adults in crisis, the elderly, and other persons needing special care. The CBJ Assembly has appointed a Social Services Advisory Board (SSAB) as a way to maintain existing social services through the expertise of a network of non-profit agencies and programs. The SSAB provides funding to agency providers for various priority care activities. Continued provision of quality services is an important community goal.

Twenty agencies entered into a Memorandum of Agreement in 2008 to work towards ending homelessness. Additionally, the CBJ and the Alaska Housing Finance Committee are working on a 10-year plan to end homelessness. "Project Homeless Connect" has had two successful years of providing needed items to the homeless including; clothing and personal items while gathering data. [see also Chapter 4 (Housing Element), and Chapter 5 (Economic Development)]

POLICY 13.3. TO PROMOTE QUALITY MEDICAL AND SOCIAL SERVICES IN THE CBJ TO I SAFETY, HEALTH, WELL-BEING AND SELF-SUFFICIENCY OF ITS RESIDENTS.

Standard Operating Procedures

13.3 - SOP1 Provide public funds for programs for the indigent and for high risk groups such as youth, the elderly, disabled persons, and homeless persons and families.

13.3 - SOP2 Support voluntary Commissions such as the Americans with Disabilities Act (ADA) Committee, the Juneau Commission on Aging, the Juneau Human Rights Commission, the Social Services Advisory Board, the Youth Activities Board and the Juneau Coalition for Youth. Encourage these groups to communicate, coordinate and cooperate among themselves and to provide a common and united voice in administrative, legislative, judicial, and general matters that may affect the professional practices of health care and social service providers and the services received by their constituents.

Implementing Actions

13.3 - IA1 Designate adequate CBJ-owned land adjacent to Bartlett Regional Hospital and outside the Salmon Creek Dam hazardous inundation area to accommodate expansion of hospital/support medical facilities.

13.3 - IA2 Establish and maintain an integrated near-homeless and homeless client assessment and referral system linking all housing, medical and social service providers, to develop greater efficiencies, client tracking and program funding and evaluation tools.

13.3 - IA3 Provide transportation assistance to homeless clients, including high school students, to support transport for job search efforts, to shelter, and for medical and social service care.

13.3 - IA4 Establish and maintain a coordinated substance abuse prevention program, and comprehensive treatment, rehabilitation, and recovery programs for Juneau residents.

13.3 - IA5 Support organizations that coordinate volunteer funding of many social service providers, such as the United Way and the Juneau Coordinated Transportation Coalition.

CHAPTER 14
COMMUNITY EDUCATION AND SERVICES

Schools

Schools are among the most important public services society provides for its residents. Not only are they the centers of learning for our children, they are also important focal points for neighborhood activities. The health and vitality of the community's schools is invariably a clear indicator of the health and vitality of the community itself. In a community values survey conducted for the 2008 Plan Update, providing a "quality education from pre-school to University" was ranked second in value, behind "keeping Juneau a safe place to raise a family" and above "maintaining a strong economy with good paying jobs."

For the 2012-13 school year , the Juneau School District (JSD) is serving approximately 5,000 students in two high schools, one alternative high school, two middle schools, six elementary schools, a K-8 Charter School, a district-wide K-12 correspondence program, and a Tlingit Culture, Language, and Literacy program.

At its Auke Bay campus, the University of Alaska Southeast (UAS) grants undergraduate degrees in a variety of fields. Proposed expansion to accommodate a projected 40 percent increase in full-time "traditional" or face-to-face students (from 850 in 2011 to 1200 in 2021) will create pressure in the area for additional support services such as affordable housing, restaurants, stores and public transportation.

One of the most important factors influencing the quality of life in a community is a good elementary, secondary, and university educational system. In addition to its role as an important source of jobs and revenue, UAS offers educational and technical training to Juneau's population. The University of Alaska Fairbanks (UAF) also offers programs and classes in Juneau. Collectively, UAS and UAF are referred to in this Plan as the University of Alaska (UA), although the University of Alaska Anchorage is part of the UA system and does not offer face-to-face courses in Juneau. All three schools in the UA program also offer a wide variety of distance education opportunities, and students of one university can take classes that are offered by the other universities in the system.

POLICY 14.1. TO PROVIDE A STRONG SYSTEM OF HIGH QUALITY PUBLIC EDUCATION TO ENABLE ALL STUDENTS TO BECOME WELL EDUCATED, INFORMED RESIDENTS WHO UNDERSTAND AND APPRECIATE DIVERSE CULTURES AND WHO ARE EQUIPPED TO PURSUE FURTHER EDUCATION AND COMPETE SUCCESSFULLY IN THE WORK FORCE.

Standard Operating Procedures

14.1 - SOP1 Encourage the Juneau School District to establish high standards for curriculum content and other factors and facilities contributing to a high quality of education for all of the CBJ's students.

14.1 - SOP2 Work closely with the staff of UAS in neighborhood planning efforts for the Auke Bay area that considers the on- and off-site impacts and requirements associated with UAS expansion. This should include impacts on housing and on transit, vehicle, pedestrian and bicycle transportation systems.

14.1 - SOP3 Coordinate and cooperate with UAS and UAF (UA) in the development of UA infrastructure, housing, vehicular and pedestrian access, trails, educational and recreational facilities and to the protection and conservation of natural habitat in and around UA facilities that contributes to a successful learning environment.

14.1 - SOP4 Incorporate Planning Commission review in the siting of public, parochial and private sc assure land use compatibility and to encourage the shared use of outdoor play areas and parking resources with nearby residential, cultural or institutional uses.

14.1 – SOP5 Support existing and development of new vocational education programs and facilities throughout the community to promote workforce development in construction, mining, and other fields.

Development Guidelines

14.1 - DG1 Recognize student needs for pedestrian safety and a quiet environment conducive to learning when making land use and transportation decisions. Proposed developments should be reviewed for potential impacts on school capacities and the extent to which the development will create a need for additional school facilities.

14.1 - DG2 Ensure that new UAS facilities and educational programs are planned, sited and designed to enhance their availability to Juneau residents. Of particular concern are facilities and educational programs that facilitate community sustainability objectives and long-term economic development goals.

Implementing Actions

14.1 - IA1 Continue and strengthen efforts to reduce the drop-out rate of high school students.

14.1 - IA2 Work with the Juneau School District and University to ensure that the schools provide basic safety and knowledge education in subject matters that sustain local culture and recreational values such as marine ecology, boat safety, fishing, hunting education and safety, subsistence agriculture and harvesting and similar subjects that facilitate local production or harvesting and consumption of food and fiber.

14.1 - IA3 Work with the Alaska Department of Fish and Game, University Extension, United States Soils Conservation Agencies, and local organizations such as Trout Unlimited, 4H, Community Gardens and other relevant groups and agencies to promote community education regarding hunting and fishing skills and ethics, animal husbandry, crop-raising, marketing and bartering systems, home recycling, composting, non-fossil fuel energy systems, water conservation and other energy- and food-independence skills and knowledge.

14.1 - IA4 Evaluate existing school facilities for possible expansion if they are determined to need additional outdoor space for physical education. Of particular concern are expansion of covered playgrounds and other recreation facilities to ensure all-weather outdoor physical exercise and play.

14.1 - IA5 Support University efforts to bring speakers, artists, musicians and others to Juneau. These initiatives enrich the cultural life of the community and support the expansion of Juneau as an artistic and cultural capital.

Libraries

The CBJ Public Libraries provide materials and services to help community residents of all ages obtain information to meet their personal, educational, and professional needs, and to support literacy and lifelong learning. Libraries are a vital component of the community, providing information to businesses, agencies, visitors, and individuals seeking personal and professional growth. The CBJ operates a main library in downtown Juneau and branches in downtown Douglas and the Mendenhall Valley.

A 17,000-square-foot main library was opened in December 1988, on the newly-constructed fifth floor of the Marine Park Garage on the downtown Juneau waterfront. Six thousand additional square feet is available for expansion on that site. This central location is convenient for use of library materials, internet facilities and meeting rooms for downtown residents, workers and over a million cruise ship guests and crew members.

The Douglas Public Library is located in a combined library/fire station that opened in 1987. Approximately 6,000 square feet is dedicated to the Library and a public meeting room. The Mendenhall Valley Public Library is located in a 9,391 square-foot leased storefront in the Mendenhall Mall. Space and electronic needs in the next ten years

will require construction of a new building in the Mendenhall Valley to serve these needs. A new Mendenhall Valley library received a portion of its required construction funding from state and local sources in 2012.

The three public libraries are part of the Capital City Libraries cooperative, which includes the Alaska State Library, the University of Alaska Southeast Egan Library, and the Sealaska Heritage Institute. These libraries share an automated circulation and on-line public catalog system. The public is free to use any of the Capital City Libraries with one library card. The Capital City Libraries cooperate in the provision of print and electronic resources to avoid unnecessary duplication and broaden the scope of information available within the community.

Optimum use of on-line networks and cooperative systems is essential in this new electronic age of international connectivity through the Internet. The Juneau Public Libraries provide public access to the Internet, guide users in finding its unique resources, and maintain the on-line information presence that makes Juneau, as Alaska's Capital City, a destination for Internet users worldwide. Providing children with the skills necessary to effectively navigate electronic information sources is a critical component of preparing future generations of Juneauites to participate in the global and information economy.

POLICY 14.2. TO FOSTER LITERACY AND TO PROVIDE FREE ACCESS TO LIBRARY FACILITIES AND SERVICES.

Standard Operating Procedures

14.2 - SOP1 Identify and pursue local, state and federal funding sources for library services.

14.2 - SOP2 Provide support to the Library such that each library facility provides consistent and reasonable public service hours.

14.2 - SOP3 Continue resource-sharing and electronic networking efforts to provide for the most efficient, far-reaching and cost effective library services for the CBJ.

Implementing Action

14.2 - IA1 Provide a city-owned library and community center at a convenient location in the Mendenhall Valley.

14.2 – IA2 Continue to expand and support the provision of and access to computers and advanced technology in the library system.

Child Care

There is a critical child care shortage in Juneau, and that lack of quality child care makes Juneau a less than attractive place – and even an untenable home - for young families.

In 2012, the CBJ Assembly included funding in the FY13 and FY14 budgets for the Hiring, Educating, and Retaining Teaching Staff (HEARTS) program, which provides financial support to child care providers with the goal of improving the child care situation in Juneau.

By funding the HEARTS program, the CBJ government has provided incentives to increase licensed child care capacity and ensure that the quality of that care is at a level that will result in positive outcomes for Juneau's children and families. This program is in its infancy, and its long-term impacts remain to be seen, but the critical need for quality, affordable child care remains in the community at this time.

POLICY 14.3. TO SUPPORT THE PROVISION OF QUALITY CHILD CARE IN A SAFE LEARNING ENVIRONMENT BY WELL-TRAINED EDUCATORS AND CHILD CARE PROVIDERS.

Standard Operating Procedures

14.3 – SOP1 Work with child care providers, advocates, and other stakeholders to ensure that regulatory or permitting requirements do not unduly restrict the availability of affordable, quality child care in Juneau.

14.4 – SOP2 Provide support of child care providers as needed to ensure an adequate supply of available affordable, quality child care opportunities.

CHAPTER 15
CULTURAL ARTS AND HUMANITIES

Juneau residents have shown longstanding support and appreciation of the arts and humanities and the cultural opportunities they provide. As residents of a small city separated from other urban centers, Juneauites have relied upon local resources to promote the arts. The municipality has achieved state and national recognition for the important role played by the arts in community life.

Recognizing that the arts, history and cultural diversity are central to the well-being of its residents, the CBJ government has done much to encourage the development of these activities in and around the community. As a state capital, however, more needs to be done to provide venues that are readily accessible to all, whether local, regional, state, national or international in scope, and in a setting that is befitting a Capital City.

Anchored by the Alaska State Museum, Andrew Hope Hall, the Alaska State Library in the State Office Building, and Capital Community Broadcasting, Inc, the area bordered by Gold Creek, Willoughby Avenue, Main Street, and Egan Drive is developing as a center for cultural activities. With Centennial Hall serving as the visitor and convention center and two hotels located within these boundaries, the area is readily accessible both to locals and visitors. The Downtown Transit Center that opened in December 2010 provides a hub to conveniently access the many activities that are available downtown. The planned performing arts center / Perseverance Theater collaboration will draw more people to the "cultural campus" and reinforce the year-round health of the adjacent business district as befits a State Capital. The State of Alaska has begun work on a new consolidated library, archives, and museum building on the site of the current State Museum; this is the state's first major capital investment in Juneau in over thirty years, and is the largest investment in the cultural campus/capital complex since the area was conceived. Just outside the cultural campus and in the heart of historic downtown Juneau, the Sealaska Heritage Institute is developing a new cultural center at the intersection of Seward and Front Streets, adjacent to the Institute's current location at Sealaska Plaza.

The current level of cultural activity exceeds the capacity of existing facilities to provide appropriate places for expression. As the community grows, and as the desire and need for a diversity of cultural and artistic activities and events increases, the need for adequate facilities will become more pressing. Adequate facilities would encourage growth in the arts and humanities as a potentially significant economic as well as cultural element in the Capital City.

The arts industry plays a significant role in the CBJ economy, and with adequate facilities, can play an even greater role. Aside from the potential for direct economic benefits, improvements in the cultural environment would support and enhance the general quality of life for residents and provide additional opportunities for visitors as well.

Another important aspect of the quality of life in the community is the design and aesthetics of the community's built environment. New construction is an inherent component of a vital and growing community. New structures, both public and private, are almost always significant additions to the visual landscape, and architecture is a significant part of a community's culture and public identity. Particularly as the Capital City, the CBJ's built environment should be a positive part of this culture, contributing in its own way, as does the natural environment, to the positive image of our city. To this end, the architectural character of the built environment should be strengthened and enhanced. In the Downtown Historic District, emphasis is well placed on respecting the historic character of the area. In other visible areas, architecture, urban design, terrain and vegetation should enhance the visual character of the site and environs [related policies are found in the Policy 10.6 section of this Plan pertaining to design review].

POLICY 15.1. TO SUPPORT THE ARTS AS A VITAL ELEMENT OF COMMUNITY LIFE AND TO REC THE IMPORTANT ROLE THAT THE ARTS PLAY IN THE CULTURAL, SOCIAL, AND ECONOMIC WELL-BEING OF THE COMMUNITY. IT IS FURTHER THE POLICY OF THE CBJ TO STRENGTHEN ITS ROLE AS A REGIONAL CULTURAL RESOURCE TO THE COMMUNITIES OF SOUTHEAST ALASKA.

Standard Operating Procedures

15.1 - SOP1 Require that at least one percent of the construction, remodeling or renovation costs of a public facility be reserved for public art. Promote the purchase of durable art for the community.

15.1 - SOP2 Maintain and further develop the municipal art bank as a collection of art and artifacts that depict the history of the community, its people, fish and wildlife and natural setting. The CBJ government should secure a stable source of funding for maintenance and repair of the public art collection in the art bank.

15.1 - SOP3 Through the CBJ's designated arts agency, the Juneau Arts and Humanities Council: make funds available to individual artists and arts organizations; sponsor summer weekly concerts in Marine Park and other locations; provide the community with technical assistance, reference and resource material; and rental equipment, and encourage a broad range of artistic and community uses of the Juneau Arts and Culture Center or a new Performing Arts Center [see 15.1 – IA2].

15.1 - SOP4 Officially welcome participants, and otherwise encourage large regional artistic, social, and other cultural events such as the biennial Tlingit, Haida and Tsimshian Celebration and the folk, classical, and jazz music festivals.

Implementing Actions

15.1 – IA1 Through the Capital Improvement Program (CIP), promote the expansion of facilities for a wide variety of cultural activities, including performing and visual arts and neighborhood cultural centers.

15.1 – IA2 Promote the development of a Juneau Performing Arts Center in downtown Juneau as well as making needed improvements to Centennial Hall to provide venues for live performances, visual arts, receptions, public meetings, and convention-related presentations.

15.1 – IA3 Support the concentration of arts, entertainment, dining, museum and cultural activities and venues as a cultural campus that integrates such things as artists workshops, housing, and joint-use parking in the area of downtown Juneau near the Capitol Complex.

15.1 – IA4 Strengthen the CBJ's urban design policies, guidelines, standards and procedures to protect and enhance the community's visual environment, particularly as it relates to and complements the beauty, scale and terrain of the natural environment. Increased public review and scrutiny should be provided for projects having or likely to have a significant visual impact. View corridors should be identified and standards adopted to protect them.

15.1 – IA5 Support facilities, institutions, organizations and individual artists that enable Juneau to maintain its role and stature as the Capital City.

15.1 – IA6 Amend CBJ 49, the Land Use Code, as needed to implement the neighborhood design envisioned in Chapter 5 of the *Willoughby District Land Use Plan*.

15.1 – IA7 Support arts education and venues in the Juneau School District.

CHAPTER 16
HISTORIC AND CULTURAL RESOURCES

Juneau has a rich and unique history, dating back thousands of years to the ancestors of the Tlingit Indians who fished, hunted, trapped, and traded throughout the area. Long before the city was founded by Richard Harris and Joe Juneau, the Tlingit Aak'w Kwáan (Small Lake Tribe) arrived near Auke Bay from the Stikine River area, trading with early Russian, American, and English ships. With the discovery of gold and the city's founding in 1880, hundreds of miners, merchants, and laborers flocked to Juneau from all over the world, contributing to both the culture and architecture of the community, much of which still exists today.

Juneau possesses a wealth of historic resources, and it is in the best interest of the community to identify and preserve these artifacts, structures, and sites that contribute to the historic and cultural diversity of the community. Current (2006) documentation lists 479 buildings that were built before or during the first quarter of the last century. Countless numbers of additional sites and structures await documentation. These resources are part of the community's heritage, and their identification and preservation are paramount in maintaining the community's sense of place in the new millennium.

Over the past thirty years, the CBJ has been one of the most active communities in Alaska in its historic preservation efforts. As the State Capital, it is appropriate for the CBJ government to set an example to the rest of the state in responsible planning, urban design, and the preservation of its heritage and historic and cultural resources.

The existing policy regarding historic preservation, although a basic good start toward recognizing and protecting valuable historic resources, no longer provides the complete protections necessary given the dramatic rise of cruise ship tourism and the resulting pressure on historic resources from the heritage tourism trade. Although heritage tourism has been shown to be an economic asset, and has been identified in a recent local tourism survey as an area of interest and expansion, the CBJ government should update and adopt its draft version of the Historic and Cultural Preservation Plan, as well as continually evaluate its existing historic district design standards and update its design review process, in order to better integrate preservation activities into broader community and land use planning efforts. Both serve to foster heritage tourism in the community while helping to protect the fragile resources from the dynamic seasonal tourism market.

While the greatest density of historic resources is found in the Juneau Downtown Historic District, valuable historic artifacts, buildings, and sites are located throughout the borough. The general character of the community as a whole is enhanced by the very existence of these historic neighborhoods, cultural sites, and other resources. Owners of historic buildings should be educated, encouraged, and assisted in the preservation of these important features of the community. In addition, the CBJ government should be a role model to the local community by appropriately preserving and maintaining public historic buildings and facilities with care. Furthermore, the Juneau-Douglas City Museum should be promoted as an important community resource in the preservation, education, and exhibition of community heritage.

POLICY 16.1. TO IDENTIFY, PRESERVE AND PROTECT JUNEAU'S DIVERSE HISTORIC AND CULT RESOURCES, AND TO PROMOTE HISTORIC PRESERVATION AND ACCURATELY REPRESENT JUNEAU'S UNIQUE HERITAGE THROUGH PUBLICATIONS, OUTREACH, AND HERITAGE TOURISM.

POLICY 16.2. TO IDENTIFY HISTORIC RESOURCES WITHIN THE CBJ AND TO TAKE APPROPRIATE MEASURES TO DOCUMENT AND PRESERVE THESE RESOURCES.

Standard Operating Procedures

16.2 - SOP1 Inventory historic resources within the identified historic neighborhoods, as well as other areas listed in the Historic and Cultural Preservation Plan.

16.2 - SOP2 Encourage and provide incentives to owners of significant historic properties to maintain them in their original character.

16.2 - SOP3 Create a local landmarks designation for identified historic resources with significance to local culture or heritage.

16.2 - SOP4 Identify appropriate regulatory measures to protect identified historic resources, including but not limited to demolition protection and the issuance of Certificates of Appropriateness for exterior alterations to designated historic structures.

16.2 - SOP5 Develop additional local incentives for historic preservation, including tax incentives, low interest loans, and technical assistance.

16.2 - SOP6 Limit further degradation to existing historic districts by discouraging development that is inconsistent with historic district development standards.

16.2 – SOP7 Treat and maintain grave sites and other memorials with respect for applicable cultural traditions.

Implementing Action

16.2 - IA1 Publish strengthened design guidelines that will assist historic building owners in planning alterations or new construction within historic neighborhoods and districts while preventing degradation of historic resources.

16.2 – IA2 Maintain, and amend as necessary, development standards that protect historic resources while allowing development that is consistent with the other Policies and supporting statements in this Plan, such as development of additional housing in the downtown area.

POLICY 16.3. TO INCREASE PUBLIC AWARENESS OF THE VALUE AND IMPORTANCE OF JUNEAU'S ARCHAEOLOGICAL AND HISTORIC RESOURCES, AND TO EDUCATE, ENCOURAGE, AND ASSIST THE GENERAL PUBLIC IN PRESERVING HERITAGE AND RECOGNIZING THE VALUE OF HISTORIC PRESERVATION.

Standard Operating Procedure

16.3 - SOP1 Support and enhance the Juneau-Douglas City Museum as a repository for heritage materials and information held in public trust.

Implementing Action

16.3 - IA1 Update and adopt the draft *Historic Preservation Plan* as an element of the CBJ *Comprehensive Plan* that sets forth goals and objectives for organizing preservation activities and integrating preservation into broader community and land use planning efforts.

POLICY 16.4. TO PRESERVE AND PROTECT THE UNIQUE CULTURE OF JUNEAU'S NATIV INCLUDING BUILDINGS, SITES, ARTIFACTS, TOTEMS, TRADITIONS, LIFESTYLES, LANGUAGES, AND HISTORIES.

Standard Operating Procedures

16.4 - SOP1 Implement programs to educate local residents and visitors to the community about the CBJ's indigenous peoples, through publications, museum outreach, interpretive exhibits, and other measures.

16.4 - SOP2 Work with local native groups to build partnerships to identify and preserve significant cultural resources and sites.

POLICY 16.5. TO PROMOTE RESPONSIBLE HERITAGE TOURISM THAT ACCURATELY REPRESENTS JUNEAU'S UNIQUE HISTORY, WHILE PROTECTING THE RESOURCES FROM OVERUSE OR HARM.

Implementing Actions

16.5 - IA1 Develop interpretive materials for placement throughout the community that inform locals and visitors about the CBJ's history.

16.5 - IA2 Develop training workshops for seasonal tourism providers to encourage the accurate depiction of the CBJ's unique history and diverse ethnic cultural heritage.

16.5 – IA3 Assess impacts of commercial tourism on cultural resources and historic sites; impose restrictions on access as needed to protect those resources.

CHAPTER 17
COMMUNITY DEVELOPMENT

In addition to providing basic water, sewer and road facilities, the CBJ government provides a number of community facilities including schools, libraries, recreational facilities, parking facilities, transit, fire stations, hospital facilities, docks, harbors, roads and seawalks. Current and planned future development projects include expansion of the seawalk, improved port and marina facilities, roads, trails and recreation facilities, improved additional facilities at the Dimond Park Complex, planning and utility extension for affordable housing projects on selected lands, and joint planning and development of a Capitol Complex with the state. However, current and planned activities are considered complementary to private development. Joint public/private partnerships may facilitate new desired community facilities such as a downtown Juneau performing arts center and an ATV/snowmobile course.

Planning and Development Responsibilities

The development of CBJ-owned lands and resources requires specialized knowledge and experience in real estate, management, financial analysis, and public administration; this function is coordinated and managed in the City Manager's Office pursuant to state law and the CBJ Charter.

POLICY 17.1. TO COORDINATE DEVELOPMENT ACTIVITIES OF THE PRIVATE AND PUBLIC SECTORS FOR PROJECTS THAT ARE CONSISTENT WITH THE COMPREHENSIVE PLAN AND MEET IMPORTANT PUBLIC NEEDS.

CBJ and Selected Lands

In 1959, at the time of statehood, Alaska was granted over 100 million acres of land from the federal government. The state, in turn, transferred thousands of acres to municipalities to provide opportunities for community expansion. This was accomplished through the Municipal Entitlement Act of 1978. The CBJ government owns and manages approximately 26,600 acres of land. Over 19,500 of those acres were part of the CBJ's municipal land entitlement from the State of Alaska. Most of this land is remote and contains high-value wetlands and very steep and rough terrain. About 6,150 acres lie within the Urban Service Area Boundary (USAB) and, of this, about 3,560 acres are vacant due primarily to the presence of steep slopes, wetlands, the absence of access roads and utilities and, in some cases, the presence of avalanche and landslide hazards. Due to these constraints, only about 350 acres, on five sites of CBJ-owned land within the USAB, can be considered "buildable" within the 20-year planning horizon of this Plan. That short- to medium-term time period is contingent upon receiving state and/or federal funding to build roads to those sites as well as to improve existing congested intersections that would serve those sites' new residents. Notwithstanding those constraints and hurdles to development, the CBJ government intends to make as much of its buildable land as is possible available to private for-profit and/or non-profit residential builders for construction of new low- to moderate-income affordable housing. The CBJ government will also continue to seek lands for industry to facilitate the retention and expansion of full-time, year-round employment opportunities that pay a living wage with benefits. Careful evaluation of development potential and market demand for CBJ-owned lands is being undertaken in planning for their efficient and appropriate use.

Other sections of the Comprehensive Plan address community development issues more specifically; these are found in Chapters 4 (Housing Element), 10 (Land Use), 11 (Land Use Maps and Subarea Guidelines) and 18 (Implementation and Administration).

POLICY 17.2. TO HOLD CERTAIN LANDS IN THE PUBLIC TRUST, AND TO DISPOSE OF CERTAIN FOR PRIVATE USE WHEN DISPOSAL SERVES THE PUBLIC INTEREST.

Standard Operating Procedures

17.2 - SOP1 Evaluate the use and development potential of all CBJ-owned lands and incorporate appropriate plans for those lands into the CBJ *Land Management Plan* and Land Disposal Program, which is to be consistent with the *Comprehensive Plan*. The *Land Management Plan* serves as the major means of implementing policies and guiding management, development and disposition of selected CBJ-owned lands.

17.2 - SOP2 Evaluate the opportunities for joint development of CBJ-owned lands with state and private landholders.

17.2 - SOP3 Classify CBJ-owned lands for residential, commercial, industrial, recreation or resource uses, or natural areas, based on the policies, guidelines and land use designations of this *Plan*.

17.2 - SOP4 Base decisions regarding disposal of CBJ-owned lands on demonstrated market demand and evidence that disposal will be in the public interest and, particularly, for projects that would provide affordable housing or that would create jobs that pay a living wage. Coordinate activities with an orderly system for extending and constructing the public facilities and services called for in the transportation/public facilities and services element of the Plan.

17.2 - SOP5 Evaluate land not scheduled for immediate disposal for possible interim uses prior to private development.

17.2 - SOP6 Enact a general application ordinance that specifies that any use of CBJ-owned lands for commercial gain, other than the passage of commercial vehicles over public streets, must occur under a permit from the CBJ government and after payment of a fee.

Development Guideline

17.2 - DG1 To the greatest extent practicable, retain shoreline and riparian lands in public ownership. However, where disposal of such lands is deemed by the Assembly to be appropriate, ensure the provision of public access to the shoreline and water including provision of adequate trail head or boat launch areas, and retention of a public access easement along beaches.

Implementing Action

17.2 - IA1 Seek to acquire lands located in hazardous areas for open space/natural areas land use designations as well as lands located along riparian habitat for stream protection and greenbelt purposes.

17.2 – IA2 Conduct subarea and neighborhoodplanning efforts, and update completed plans as necessary, to address the specific needs of small planning areas within the borough.

17.2 – IA3 Review CBJ land disposal polices and consider revising those policies to allow disposal of CBJ-owned property through leases instead of sale.

CHAPTER 18
IMPLEMENTATION AND ADMINISTRATION

The policies in this *Comprehensive Plan* concern the natural and human factors that will influence Juneau's growth. They reflect the expressed desire of the residents to build upon the best characteristics of their community and mitigate problems that may arise from uncontrolled development. This *Plan* and its components are adopted by the Assembly as official and binding policy for actions taken by any CBJ Department, Commission or Board. The key to assuring successful use of the *Plan* in day-to-day civic affairs is making sure the *Plan* is available and accessible to those who need to be aware of the policies it contains. Administratively, this is one of the duties of the Community Development Department, which needs to consult the *Plan* on a regular basis when it carries out its other duties and in the course of working with other CBJ departments and deliberative bodies.

Proper implementation and administration of the *Plan* depends on a number of other activities as well, not the least of which is to be aware of where the *Plan* is inadequate to address an issue or where the *Plan* has unintended consequences. In these cases, the CBJ must consider amending the *Plan* in the face of new information or unexpected or changed circumstances. For both assuring that actions are consistent with the *Plan*, and for assuring the *Plan* is responsive to public needs and changing conditions, the CBJ must:

- Monitor changes in land use, social, economic and environmental conditions and periodically review and update the *Plan* to reflect these factors;
- Maintain and use procedures to amend the *Plan* to address needs of individual property owners;
- Provide for ongoing resident involvement in the land use decision making process; and
- Coordinate municipal activities with state and federal agencies with regard to decisions of mutual concern.

The Comprehensive Plan as a Guiding Planning Document

The *Comprehensive Plan* provides a rational and consistent policy basis for guiding all future CBJ government growth and development decisions. This requires that each land use decision, from the most minor variance to the development of a New Growth Area, be evaluated for its compliance with the policies, guidelines, standards and criteria established in the *Plan*. To ensure this, procedures must be followed to require that routine consultation of the *Plan* is an integral part of the land use decision making process.

The *Plan* contains 123 Policies, each of which may have an associated "Standard Operating Procedure," "Development Guideline," and/or "Implementing Action," which are directives for how to carry out the policy. As a preliminary matter, the reviewer must determine which Policies are relevant to the subject at hand. Of course, the writers of the *Plan* cannot envision every sort of proposal that might one day be conceived and analyzed against the Policies. In that vein, such analyses are not conducted on an absolute basis. That is, failure of a proposal to conform to one particular Policy in the *Plan* does not automatically mean that it is inappropriate if conformance is shown with other policies of the *Plan*. Thus, the analysis is one of balancing the many relevant policies and looking holistically at the particular situation, site and its environs.

POLICY 18.1. TO ESTABLISH THIS COMPREHENSIVE PLAN AS THE PRIMARY POLICY DOC WITH WHICH TO GUIDE RESOURCE CONSERVATION AND FUTURE GROWTH AND DEVELOPMENT AND TO MANAGE THE PHYSICAL ENVIRONMENT.

Standard Operating Procedure

18.1 - SOP1 Evaluate all ordinances, plans, capital improvements and public programs to ensure their consistency with the *Comprehensive Plan*. For specific land use or permit applications, require the applicant, whether a public agency or private property owner, to demonstrate compliance to each applicable policy or provide evidence why an exception to a policy is warranted. Incorporate statements regarding compliance/non-compliance with Policies into findings of fact that provide the legal basis for determining approval or disapproval of a development application.

Implementing Actions

18.1 - IA1 Base Community Development Department annual budgets on *Plan* implementation needs and priorities, including the development of GIS-based planning tools; assess staff capacity to prepare *Plan* implementing actions on a timely basis.

18.1 - IA2 Revise, as necessary, zoning, subdivision and other land development ordinances to ensure consistency with the Plan's provisions. Amend the Land Use Code Maps (zoning designation maps), considering them to be the official application of the *Comprehensive Plan* Maps, to ensure that the zoning designations of specific sites within the CBJ are consistent with the Land Use Map designations of this *Plan*.

18.1 - IA3 Support residents' advisory committees to advise the Planning Commission and CBJ Assembly in related planning matters.

Amendment and Updating

A comprehensive plan is an effective policy instrument only if it is periodically updated to reflect current conditions and needs. The general policy below, which calls for review of the *Plan* roughly every other budget cycle, or two years after the completion of the last update, will provide the community with opportunities to make important mid-course corrections that respond to identified deficiencies and problems and/or accommodate changing social, economic, and environmental conditions. It is important to highlight the distinction between the Planning Commission's "review" of the *Plan*, their entertaining a specific "amendment" to the *Plan*, and "updating" the *Plan*. At the direction of the Assembly, their own discretion, or at the suggestion of CBJ staff or members of the public, the Planning Commission may seek to review and give consideration to an amendment to a land use map designation, or may seek to review a particular Policy, Standard Operating Procedure or Development Guideline for currency, or the Commission may seek to delete or add an Implementing Action to a Policy section. This type of review or amendment should be simply a matter of arranging for one or more public sessions of discussion and examination of the particular specific review or amendment to the *Plan*. The conclusion of a review session might be that the *Plan* is holding up well and does not need any change. If an amendment is deemed warranted by the Commission, they would recommend such to the CBJ Assembly for their consideration for adoption.

An update is considered to involve a wholesale review of all preamble text, Policies, Standard Operating Procedures, Development Guidelines, Implementing Actions and Land Use Map Designations, such as occurred in the 2008 and 2013 updates.

POLICY 18.2. FOR THE PLANNING COMMISSION TO INITIATE A GENERAL REVIEW OF *COMPREHENSIVE PLAN* TWO YEARS AFTER THE ADOPTION OF THE LAST UPDATE, AND TO MAKE RECOMMENDATIONS TO THE ASSEMBLY TO AMEND IT AS NECESSARY TO REFLECT CHANGING CONDITIONS AND NEEDS AND TO CONSIDER AND ENACT AMENDMENTS TO THE PLAN AND LAND USE MAPS, INCLUDING AMENDMENTS TO THE URBAN SERVICE AREA BOUNDARY, AT ANY TIME THE PLANNING COMMISSION AND ASSEMBLY DETERMINE THAT AMENDMENTS ARE NEEDED.

Implementing Actions

18.2 - IA1 Develop procedures to monitor changing conditions and update the CBJ land database as necessary. This may require establishing a data collection system.

18.2 - IA2 Prepare a biennial report that:

A. Indicates public and private development activity in the past period;

B. Identifies problems and deficiencies in implementing the *Plan*; and

C. Describes environmental, economic, social, demographic and other conditions that may necessitate changes and/or amendments to the *Plan*.

18.2 - IA3 Identify all general and site-specific changes, issues and concerns that should be addressed in the biennial review process, after soliciting comments from public officials, state and federal agencies, property owners, neighborhood and business organizations, and other special interest groups.

18.2 - IA4 Establish procedures governing the *Comprehensive Plan* review process including roles and responsibilities of staff and public officials, nature and extent of resident involvement, and public notice and hearing requirements.

18.2 - IA5 Adopt procedures for considering amendments to the *Plan* initiated by property owners or residents between major updates, providing that one or more of the following factors can be demonstrated that:

A. The original decision was in error because important information available at the time was not adequately considered;

B. Changing conditions and/or new information renders the original decision inappropriate; and/or

C. The proposed change is consistent with other applicable policies of the *Comprehensive Plan*, other CBJ adopted Plans, and any specific subarea plans that apply to the site/area.

POLICY 18.3. FOR THE PLANNING COMMISSION TO UNDERTAKE A FULL UPDATE OF THE *COMPREHENSIVE PLAN* AT LEAST ONCE EVERY TEN YEARS AND TO MAKE RECOMMENDATION TO THE ASSEMBLY TO AMEND IT AS NECESSARY.

Implementing Action

18.3 - IA1 When the Planning Commission finds, during its general review of the *Comprehensive Plan*, that the *Plan* warrants a major update, initiate a major update to the *Plan*.

Resident Involvement

Efforts to involve residents in the formulation and periodic updating of this *Plan* ensure that a wide range of community attitudes and interests are reflected in the final product. The process also helps develop an understanding of and support for land use planning. The CBJ government should continue to provide residents with a timely and efficient means of receiving information about local land use proposals and participating in a decision making process in a manner appropriate to the level, type and importance of the activity or decision.

POLICY 18.4. TO MAINTAIN AN ONGOING RESIDENT INVOLVEMENT PROGRAM IN RELATION TO LAND USE PLANNING.

Standard Operating Procedures

18.4 - SOP1 Encourage media coverage of land use activities; provide ample public notification of public meetings and hearings, allowing residents adequate time to respond to new proposals.

18.4 - SOP2 Encourage and facilitate the formation of CBJ-sanctioned neighborhood organizations in areas that lack such representation in order to advise the CBJ government of neighborhood and community-wide opinions in land use matters.

A. Establish procedures for neighborhood organizations including recognition provisions, meeting and notification requirements, and other factors;

B. Notify neighborhood organizations of proposed land use actions that affect them directly;

C. Submit texts of proposed ordinances and plans to affected neighborhood associations and allow for timely review and comment;

D. Provide timely technical assistance to neighborhood associations, including analysis of land use issues, and other appropriate activities; and

E. Include representatives of neighborhood organizations in the review of capital improvement programs and CBJ budgeting processes.

18.4 - SOP3 Sponsor public outreach meetings, workshops, resident advisory committees, and/or resident task forces to advise the CBJ government on major issues of community-wide concern such as solid waste disposal, New Growth Area development and downtown Juneau planning.

18.4 - SOP4 Support alternative methods for increasing public participation in the CBJ government's decision-making and planning process.

Intergovernmental Coordination

There is a continuing need for coordination between the CBJ government and state and federal agencies, as the latter governments control nearly 80 percent of the land area in the borough and have major responsibilities for managing/developing coastal and other natural resources. This *Plan* is an effective guide for future growth and development in the borough only with the cooperation of these entities.

POLICY 18.5. TO FACILITATE INTER-GOVERNMENTAL COORDINATION SO THAT DECISIONS AFFECTING LOCAL PLANNING AND DEVELOPMENT ARE RENDERED IN AN EFFICIENT AND CONSISTENT MANNER.

Standard Operating Procedure

18.5 - SOP1 Notify appropriate state and federal agencies of local actions that affect matters within their jurisdiction.

Implementing Actions

18.5 - IA1 Establish and maintain intergovernmental agreements with those state and fede have local management/development responsibilities: Alaska Departments of Transportation and Public Facilities (ADOT&PF), Fish and Game (ADF&G), Natural Resources (DNR), and Environmental Conservation (DEC); the U.S. Forest Service, Bureau of Land Management, Army Corps of Engineers, Coast Guard, and others. Utilize agreements to ensure that these agencies undertake local programs that are consistent with the *Comprehensive Plan* and Coastal Management Program and that the CBJ government is informed of activities in a timely manner.

18.5 - IA2 Assign appropriate CBJ personnel as liaisons with these agencies.

The CIP Planning Function

A recurring need in any municipality is planning for the execution of capital improvement projects. The work includes gathering the needs and expectations of operating departments into a unified document that sets priorities and is adopted by the Assembly at the same time as the annual operating budget. In the CBJ's case, the primary document is the Six-Year *Capital Improvement Program* (CIP), which is republished every year with a new year added at the "outer end" and the past year dropped off. The CIP contains a basic project list, organized by department, which shows each project that has been identified by the operating agency, a scope and estimated cost. Other sections of CIP re-list the projects by type and priority. A given project may change over the years as it advances from low priority status to higher status. This is because increasingly more planning and design consideration is given to a project which the sponsoring department has kept on the list year after year until it is finally carried out.

POLICY 18.6. TO DEVELOP A SIX-YEAR *CAPITAL IMPROVEMENT PROGRAM* TO IMPLEMENT THE *COMPREHENSIVE PLAN* BY COORDINATING URBAN SERVICES, LAND USE DECISIONS, AND FINANCIAL RESOURCES AND TO PROVIDE ADEQUATE FUNDING FOR CAPITAL IMPROVEMENTS TO ENSURE THE POLICIES, STANDARD OPERATING PROCEDURES, DEVELOPMENT GUIDELINES, IMPLEMENTING ACTIONS AND SUBAREA GUIDELINES OF THE *COMPREHENSIVE PLAN* ARE IMPLEMENTED.

Standard Operating Procedures

18.6 - SOP1 Prepare an annual Six-Year *Capital Improvement Program* (CIP). Request that CBJ departments, the public, and policy bodies nominate potential capital improvement projects from a variety of sources including the *Comprehensive Plan* and suggestions of resident and special interest groups, CBJ officials, advisory commissions, and others.

18.6 - SOP2 CDD staff will analyze each CIP project list for conformity with the *Comprehensive Plan*.

18.6 - SOP3 The CIP sponsoring department should prepare and make public related subsidiary CIP studies, reports and documents.

18.6 - SOP4 Maintain active involvement with other governmental sponsors of capital improvements and public works in general to assure that the efforts of those sponsors are compatible with local needs, conditions, and the policies of the *Comprehensive Plan*.

APPENDIX A:GLOSSARY OF TERMS USED IN THE PLAN

ACCESS: A way or means of approach to provide physical entrance to a property.

AFFORDABLE HOUSING: Dwelling units of all types that are affordable to residents whose income is below the median household income level established annually for the CBJ region by the U.S. Department of Housing and Urban Development (HUD) per household size. The generally accepted governmental standard for determining whether a person or household can afford housing is whether they are spending no more than 30 percent of their gross monthly income on housing costs, including essential utilities such as water, sanitary sewer service, garbage and home heating.

AFFORDABLE HOUSING OVERLAY DISTRICT (AHOD): A land use zoning district which would be placed on a specific property as a zoning map amendment and which would supersede the development standards, guidelines and requirements of the underlying zoning district designation for that property. Such overlay district designations are used to encourage and facilitate the development of affordable housing on select commercial, multifamily residential, mixed use and/or public properties which meet the criteria established by the overlay district. The goals and tools described in this Plan for the AHOD may be accomplished through application of bonus procedures and design or amenity requirements adopted for areas shown on the Bonus-Eligible Area Overlay District Map.

AGRICULTURE: For the purposes of a land use category within the CBJ and pursuant to this Plan, agriculture includes the breeding, raising, pasturing, grazing of livestock for the production of food and fiber; the breeding and raising of bees, fish, poultry, and other fowl; and the planting, raising, harvesting and producing of agricultural, aquacultural, horticultural, and forestry crops.

SMALL-SCALE AGRICULTURE is conducted on individual parcels of property, or combinations of parcels when area residents work the site, where the parcels are of a similar size to those in the surrounding neighborhood.

MEDIUM-SCALE AGRICULTURE is a commercial operation serving the community at large.

LARGE-SCALE AGRICULTURE is a commercial operation exporting products to areas outside the CBJ.

AMENITIES: A feature that increases attractiveness or value. Assets and resources of a particular development, neighborhood or community which make the locale a desirable place in which to live, work, shop and/or visit and includes such features as convenient location and proximity to employment, transit and services or parks; near and/or distant views of water bodies, mountains and forested areas; natural areas and active play areas; protection from severe winds and weather; light, air and privacy from neighbors; quiet ambient noise levels, and the like.

ANADROMOUS FISH: A fish or fish species that spends portions of its life cycle in both fresh and salt waters, entering fresh water from the sea to spawn.

ANADROMOUS FISH STREAM, RIVER, OR LAKE: A body of fresh water supporting one or more portions of an anadromous fish's life-cycle.

AQUACULTURE: The raising and harvesting of aquatic organisms for human use, including shellfish, mollusks, crustaceans, seaweed, kelp, algae, fish, and other aquatic life.

ATV COURSE: An open air area that legally allows off-road-vehicles, all-terrain-vehicles and/or snowmobiles in a contained arena or track and as a series of trails.

AVOIDED COST: A term used in the electrical generation industry to refer to the lowest cost of electric energy that the utility might avoid by purchasing electric energy from another source.

BASIC SECTOR INDUSTRY: A basic sector industry is one that brings in revenue from outside the community.

BELOW-MARKET-RATE (BMR) HOUSING: Housing that has a legal restriction for a specific period of time to be sold or rented at a price that is below the prevailing rate for equivalent housing units within the community. For example, dwelling units which are deemed as "affordable" by an inclusionary affordable housing requirement as a condition of a rezoning approval.

BEST MANAGEMENT PRACTICES (BMPs): Officially established (by the regulating agency or relevant industry standards) operating procedures and management practices of a business or other entity that reduce adverse impacts to the environment and environs.

BUFFER ZONE: A land area, typically a strip of land, identified in the zoning ordinance, a subdivision plat or a development plan, which protects one type of land use or density or intensity of use from another, potentially incompatible land use. The buffer land area provides a separation of the adjacent uses for visual screening, noise abatement, or light, air and privacy purposes.

BUILDABLE SITE: In Chapter 4 of this Plan, "buildable sites" are pieces of land one-quarter acre or more in size located within the Urban Service Area that are vacant or have an improvement, such as a structure, that is valued at less than $50,000 by the CBJ Assessor and upon which large portions of the land do not contain slopes greater than 18 percent or class A or B wetlands. Buildable sites considered in Chapter 4 are located near municipal water and sewer service, roads, utilities and other public services.

BUNGALOW HOUSE: A small single-family detached house as defined by Title 49, the Land Use Code.

CAPITAL IMPROVEMENT: Any public acquisition of real property, major construction, renovation or rehabilitation of a structure, or purchase of expensive equipment with a lifetime of more than one year.

CAPITAL IMPROVEMENT PROGRAM (CIP): Proposed timetable or schedule of all future capital improvements to be carried out during a specific period; each item is listed in order of priority, accompanied by a cost estimate and anticipated financing. The CIP is reviewed annually for conformance with this *Comprehensive Plan*.

CAPITOL COMPLEX: An area in downtown Juneau which could contain legislative hearing rooms, offices, meeting rooms, pedestrian-friendly circulation systems, parking, transit services, seasonal and short-term accommodations, food and beverage services, cultural and entertainment activities, and other facilities which support the legislative activities of the state capital in Juneau. This area is shown on the land use maps for Subarea 6, particularly Map M, and is centered on Telephone Hill, the proposed site of a new State Capitol building.

CARRYING CAPACITY: The number of individuals who can be supported without degrading the natural, cultural and social environment; that is, without reducing the ability of the environment to sustain the desired quality of life over the long term. A neighborhood's carrying capacity is measured by a number of elements including water, sanitary sewer service, stormwater conveyance systems, road and intersection capacity, school enrollment capacity, police, fire and emergency medical service capacity, and the like.

CENSUS: The official decennial (every ten years) inventory of population, housing units and household characteristics conducted by the United States Department of Commerce.

CENTRAL BUSINESS DISTRICT (CBD): That area bounded by 4th Street, Franklin Street, Main Street and the downtown Library.

CERTIFICATED ELECTRICAL UTILITY PROVIDER: An electrical utility operating under a Certificate of Public Convenience and Necessity (CPCN) issued by the Regulatory Commission of Alaska (RCA).

COMMERCIAL USE: Economic activity, including retail sales, personal and business services, and private and public offices.

COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG): The federal CDBG program provides annual grants on a formula basis to local governments and states. In Alaska, the CDBG program is administered by the Department of Commerce, Community, and Economic Development's Division of Community and Regional Affairs. Grants are made to local governments and area awarded based on criteria such as project readiness, adherence to state funding priorities, and community need.

COMPACT DEVELOPMENT: A strategy to encourage the most efficient use of existing municipal water, sewer, roads and other public services such as police, fire and emergency medical care, as well as to make the most efficient use of private utilities and services such as power, communication systems and garbage collection. Compact development encourages higher density development as in-fill development on parcels within a designated Urban Service Area. See also IN-FILL DEVELOPMENT

COMPREHENSIVE PLAN: A document containing a set of public policy actions regarding how the land, air and water resources of an area will be developed or conserved. It incorporates the plans and programs of various governmental units into a single document to be used as the basis for ongoing decisions and actions by these governmental agencies.

CONDOMINIUM: A form of residential or non-residential ownership of real property. In legal terms it is where undivided interest in common in a portion of real property is coupled with a separate interest in space called a unit, the boundaries of which are described on a recorded final map, parcel map, or condominium plan. The area within the boundaries may be filled with air, earth, or water, or any combination, and need not be physically attached to any land except by easements for access and, if necessary, support.

CONSERVE: To manage and utilize resources in a manner which avoids waste or destruction now and in the future.

COTTAGE HOUSING: A type of development of small, single-family homes surrounding common open space/natural areas, as defined by the Title 49 Land Use Code of the CBJ.

CULTURAL CAMPUS: An area of downtown Juneau, near the Capitol Complex, that provides a cluster of arts, crafts and performance venues, cultural and entertainment venues, arts-related workshops, studios, galleries, retail outlets, and culinary arts-related food and beverage services, along with artist housing. Typically, this would be characterized as an Arts District and would feature performances and arts attractive to local, regional and international students and residents. There would be a central or nearby parking facility that is shared with daytime users, such as the State Office Building parking garage and available for arts patrons in the evenings and week-ends. A performing arts building would be a central feature of the cultural campus whose performance spaces could also be used as meeting venues by state legislators as part of the Capitol Complex and by the Convention and Visitors Bureau for special events.

CUMULATIVE EFFECTS: Effects on the environment that result from separate, individual actions that, collectively, become significant over time and with increasing individual contribution. For example, several small parcels are developed and the vehicular traffic from each would not contribute to a reduction in the service level of a particular road or intersection but, taken together, the traffic would cause congestion of the roadway(s) or intersection(s) that serves those developments.

DAM INUNDATION AREA: An area of potential flooding from dam rupture in the event of a failure of the dam.

DECIBEL (dBa, dBA, dBc and/or dBC): A unit used to express the relative intensity of sound as it is heard by the human ear. dBA is the "A-weighted" scale for measuring sound in decibels that weights or reduces the effects of low and high frequencies in order to simulate human hearing. dBC is the "C-weighted" scale, and is used more typically to measure the sounds typically associated with the "bass" line of music. Each increase of 10 dBA or dBC intensifies the noise tenfold and doubles the perceived loudness. dBa and dBA are equivalent to each other, as are dBc and dBC.

DENSITY (Residential): The number of housing units allowed per unit of land, such as one dwelling per acre or twenty units per acre. Gross density refers to all the land area under consideration; net density is the area remaining after elimination of land for streets, parks and other public or non-residential uses.

DEVELOP: To bring about growth or availability; construct or alter a structure; make a physical change in the use or appearance of land.

DEVELOPMENT: A project or effort that results in the alteration of land, water or other natural resource, including, but not limited to the following: Placement or construction of any solid material or structure on land or water; construction of roadways and other infrastructure; discharge or disposal of dredged material or any other waste materials on land or water; grading, dredging or mining activities; subdivision or change in the density or intensity of use of specific land(s); construction on or change in the intensity of use of water; construction, reconstruction, demolition, or alteration to the size of any structure, public or private; removal or harvesting of vegetation for other than household, family, or clan subsistence use, excluding routine repair and maintenance activities.

DEVELOPMENT RIGHTS: The right to develop land by a landowner who maintains fee-simple ownership over the land or by a party other than the owner who has obtained specific rights to develop the land. Such rights are usually expressed in terms of density, building height, lot coverage and access to a public road. In legal terms, land is seen as encompassing these "bundle" of rights which can be separated and sold individually or as a whole, such as air-rights, mineral rights, development rights, etc.

EASEMENT: Right given by the owner of land to another party for a specific limited use; commonly used fo easements either above or below ground, or access for pedestrian or automobile traffic. A conservation easement would, typically, limit the development of the land and would protect and conserve the natural resources on the land in perpetuity while allowing the owner to retain the opportunity to hunt, fish, or travel on the land and, perhaps, retain water rights for personal consumption. A scenic easement would limit development of land for which such development would obstruct a public vista or landscaping.

ESTUARY: The lower course of a river, stream or creek where tidal influence is noticeable. The mixing zone of fresh and salt waters near the mouth of a water body. A body of water semi-enclosed by land and connected with the open ocean within which salt water usually is diluted by fresh water derived from the land. An estuary includes: (a) estuarine water; (b) tidelands; (c) tidal marshes; and (d) submerged lands.

FILL: Placement of sand, sediment, or other material to raise the elevation of land.

FIREWISE: A fire prevention education program, sponsored by a consortium of government fire protection organizations, to aide the general public and, particularly, property owners in fire prevention design and operating procedures for structures and landscapes [see www.firewise.org].

FLOOD INSURANCE RATE MAP (FIRM): For each community, the official map on which the Federal Emergency Management Agency (FEMA) has delineated areas of special flood hazard and the risk premium zones that are applicable to those zones.

FISHERIES: Harvest of populations or stocks of particular fish species.

FIXED-GUIDEWAY: Any transit service that uses exclusive or controlled rights-of-way or rails, entirely or in part. The term includes heavy rail, commuter rail, light rail, monorail, trolleybus, aerial tramway, inclined plane, cable car, automated guideway transit, ferryboats, that portion of motor bus service operated on exclusive or controlled rights-of-way, and high-occupancy-vehicle (HOV) lanes.

FLOAT HOME: A vessel that may be capable of movement or that is permanently moored, and which is designed to be used primarily as a residence.

FLOOR TO AREA RATIO (FAR): The ratio of a building's total floor area to the land (site) area. Typically used in land use regulations to set maximum and/or minimum building mass and scale.

GIS OR GEOGRAPHIC INFORMATION SYSTEM: A system of computer hardware, software and procedures designed to support the capture, management, manipulation, analysis, modeling, and display of spatially-related data for planning and resource management purposes. Geographic Information System (GIS) is a digital mapping system linked with various databases of geographic information such as roads, parcels, trails, streams, terrain, watercourses and the like. The data can be called upon to show each geographical feature or can call upon multiple layers of data to show numerous geographical features. Aerial photos, parcel lines, road systems, trails, topographic contours can be viewed.

HIGH OCCUPANCY VEHICLE: The term high-occupancy vehicle (HOV) can describe any motor vehicle that has two or more persons although, typically, it refers to a carpool, van, or bus.

HISTORICAL RESOURCES: Areas, sites, buildings, structures, and artifacts that have a relationship to events or conditions of the past.

HOMELESS: Persons and families who lack a fixed, regular, safe and sanitary night-time residence or shelter. The homeless include: Persons or families staying in temporary or emergency shelters; those who are accommodated with friends or other persons with the understanding that shelter is being provided as a last resort; and/or persons who are living outdoors.

HOUSE BOAT: A vessel capable of movement under its own power that is designed primarily to be used as a residence.

HOUSEHOLD: Households are comprised as one or more persons living within a dwelling unit or equivalent. A householder can be a single-person living with one or more un-related persons within a single dwelling unit.

HOUSEHOLD INCOME: Household income is the combined gross income reported to the U.S. Internal Revenue Service (IRS) by all members of the household, over the age of 18, within a 12 month period.

HOUSING ELEMENT: A chapter of this Comprehensive Plan which meets HUD standards for identifying housing need, the condition of the community's housing stock, any impediments to satisfying the housing needs of all sectors of the community. It includes goals, policies and implementation programs for the preservation, improvement and development of housing.

HOUSING TRUST: A legal mechanism to facilitate the development or rehabilitation of affordable housing. Typically, the trust holds the land on which the affordable housing lies such that the housing costs exclude the price of the land.

HOUSING TRUST FUND: Distinct funds established by government entities that dedicate sources of revenue to support affordable housing, usually created by legislation or ordinance.

HUD: The United States Department of Housing and Urban Development, the federal agency which sets forth policies for housing and community development; administers federal grants and tax credits; and sets minimum safety standards for manufactured homes and other federally-funded housing developments.

HYDROLOGIC: Relating to the occurrence and properties of water. Hydrologic hazards include flooding, which is associated with the rise of water, as well as with its movement.

IMPAIRED WATER BODY: An impaired water body is a creek, stream, river or lake that has a level of pollution that impairs the health and well-being of animal and plant aquatic life within the water body and along its banks (riparian habitat), as determined by the Alaska Department of Environmental Conservation (DEC). As described in the Water Quality section of Chapter 7 of this *Plan*, pollution could be soil sediment, hydrocarbons, fecal bacteria, heavy metals and debris.

INDEPENDENT ENERGY PRODUCER: Any company, agency, or individual which generates electrical energy by any means, but that is not a Certificated Electrical Utility Provider.

INDICATOR: Indicators provide relevant, easy to understand, and reliable information based on accessible data that reflect the status of larger systems. An indicator is a measurement that reflects the causal relationship between two or more elements of a holistic system, where changes in one element affects the status of another.

INDICATOR SPECIES: An indicator species is a species whose presence, absence, or relative well-being in a given environment is indicative of the health of its ecosystem as a whole.

INDUSTRIAL USE: The manufacture, fabrication, processing, or reduction of any article, substance, or commodity or any other treatment thereof in such a manner as to change the form, character or appearance thereof. In addition, trucking facilities, warehousing, storage facilities, businesses serving primarily industry, and similar enterprises.

IN-FILL DEVELOPMENT: Development on a vacant parcel or substantially underdeveloped property located within an existing neighborhood, typically near public transit, within the Urban Service Area.

INFRASTRUCTURE: Facilities and services needed to sustain urban development, including but not limited to water, sewer, and storm drainage systems, streets, communications, utilities, fire stations, parks, and schools.

INTENSITY: In planning, the degree to which land is used; usually refers to levels of concentration or activities of use. A low intensity use is a very discrete activity in which very little traffic is generated or very few or low-scale structures are built. A high-intensity use is one in which high volumes of traffic, noise, congestion, 24-hour activity and/or tall structures are present.

INTERTIDAL: Between the levels of mean lower low tide (MLLT) and mean higher high tide (MHHT). Lands located in such an area are referred to as tidelands.

INVASIVE SPECIES: A species that is non-native to the local ecosystem, and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

LAND TRUST: See Housing Trust

LAND USE CODE: Title 49 of the CBJ Municipal Code which regulates the use of land within the CBJ.

LAND USE CONTROLS: The use of a community's police powers to guide land use and development, usually manifested in zoning, subdivision regulations and official land use maps.

LEED (LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN): A system developed by the United States Green B Council that defines standards for what constitutes a "green" or environmentally preferable structure. The certification system is designed for rating new and renovated commercial, institutional and residential buildings and evaluates the entire building over the building's life cycle. LEED certificates are awarded at various levels (certified, silver, gold and platinum) according to a scoring system.

LEVEL OF SERVICE (LOS): Levels of service is a qualitative measure by which transportation planners describe the efficiency of a traffic stream and the way in which such conditions are perceived by persons traveling the traffic stream. Level of Service (LOS) measurements describe conditions such as speed, travel time, freedom to maneuver, traffic interruptions, traveler comfort and convenience and safety. The LOS system uses the letters A through F to characterize the level of congestion of a feature, with A being the best or least congested and F being the worst or most congested condition.

LIFE CYCLE COSTS: The total cost of creation, delivery, and ownership of an asset over the life of the asset.

LIGHT RAIL TRANSIT: Trolley buses or trains that typically operate in mixed traffic and in non-exclusive, at-grade rights-of-way. Vehicles are self-propelled by electricity or other power and usually operate in one or two-car trains. See also FIXED-GUIDEWAY

LIVABLE WAGE: This refers to a salary or wage for a resident which would enable the employee to pay for rent on a dwelling unit which is sized to adequately accommodate his or her self and dependent household members while paying no more than thirty percent (30%) of his or her gross monthly income for rent and essential utilities such as water, sanitary sewer, garbage disposal and home heating.

LIVABILITY: A standard which describes how people respond to the built, social and natural environments in which they live, shop and work and includes human perceptions of how well the structures, roads, vegetation, pedestrian circulation systems, and the like within that environment provide safety, light, air and privacy, open space/natural areas, convenience, affordability and a general sense of well-being.

LIVE-A-BOARD: A vessel capable of movement that serves as a residence, although it was not designed primarily for residential use.

MANUFACTURED HOME: A dwelling unit constructed entirely in a factory (off the site of its occupancy) and constructed on a chassis to facilitate its movement to a permanent or temporary site and designed to meet HUD safety standards.

MASS AND SCALE OF DEVELOPMENT: The bulk of a building or group of buildings, defined by the building height, façade length, and depth. Mass and scale are typically measured by Floor to Area Ratio (FAR).

MEAN HIGH WATER MARK: A tidal datum used in referring to tidelands or the tidally affected portion of the stream that is equal to the average of all high tides over a 19-year Metonic cycle, as established by the National Ocean Service of the National Oceanic and Atmospheric Administration.

MEAN LOWER LOW WATER (MLLW): A tidal datum used in referring to tidelands or the tidally affected portion of the stream, that is equal to the average of the lower of the two low tides of each day over a 19-year Metonic cycle, as established by the National Ocean Service of the National Oceanic and Atmospheric Administration.

MEDIAN HOUSEHOLD INCOME: The sum of money income received in the previous calendar year by all household members 15 years old and over, including household members not related to the householder, people living alone, and others in nonfamily households. Median income is the mid-point income in an ordered distribution of all household income levels.

MITIGATION MEASURE: An action or series of actions designed to avoid, reduce, or compensate for the adverse impact or effect of a development on the site or surrounding environs or neighborhood.

MIXED USE DEVELOPMENT: A mixed use development is one that provides space for two or more land use activities, typically for residential and non-residential uses. Typically a mixed use development will have vertical mixing of the uses with ground floor retail space, a second or more floors of office space and housing above. A horizontal mixed use development could have multiple structures with each structure devoted to a particular land use, such as a church with a school or day care center.

MOBILE HOME: A dwelling unit manufactured off-site before 1976 and constructed on a chassis to facil to its permanent site, but not designed and built to HUD safety standards or the specifications of the Uniform Building Code for conventional structures. Typically, mobile homes have aluminum electrical wiring rather than copper electrical wiring; do not have fire-proof insulation around the furnace and water heater; do not have double exits; and do not have windows large enough to escape through in the bedrooms in the event of a fire. The term mobile home does not include a manufactured home, modular or panelized home, "kit" home or Recreational Vehicle-type trailers.

MODULAR HOMES: Modular homes, panelized homes or kit homes are homes in which sections of the dwelling are manufactured off-site and are packaged and delivered to a home site and assembled at the site. Some modular homes are fully assembled in a factory and are simply installed on-site; they differentiate from manufactured homes in that they are not built on chassis.

MODE SPLIT: The percentage share of total trips for each mode or method of transportation, such as drive along, carpool, public transit, bicycle or walk to reach a destination. An "18 percent transit share" means that transit is used for 18 out of 100 trips from home to work.

MULTI-MODAL TRANSPORTATION SYSTEM: Multi-modal means more than one means of travel or transport. For example, a multi-modal transportation system might have sidewalks and trails for pedestrians, bicycle paths separated from vehicle traffic, public transportation facilities such as buses, carpool vehicles and high-occupancy-vehicle lanes for carpool travel and parking, and parking facilities for all motorized and non-motorized vehicles, as well as marine and air components.

NATURAL AREAS: Land areas that have not been disturbed by alteration of the terrain or vegetation and not developed with structures or roads, other than those needed to maintain the lands or for non-motorized trails.

NEW GROWTH AREA: Sites in rural and remote areas quite distant from the Urban Service Area and potentially suitable for urban/suburban development as a self-contained community. New Growth Areas shall be developed according to a master plan or master development plan recommended by the Planning Commission and adopted by the CBJ Assembly. These remote communities are characterized by compact development of urban densities and a full complement of services and facilities, including water and sewer, recreational, educational and neighborhood commercial services provided therein. Non-residential primary uses such as dock and port facilities or resource-related industrial development, e.g. a lumber mill or fish processing plant, may also be appropriate.

NOISE: A sound that is perceived by the human ear and is deemed by the receptor as undesirable because it interferes with speech, hearing or sleep, or that is intense enough to damage hearing, or is of a duration or frequency that is annoying. See also DECIBLE

NON-PROFIT HOUSING DEVELOPMENT CORPORATION: A tax-exempt corporation formed for the purpose of building housing, typically, for low- and moderate-income households. The corporation builds the units and would operate and maintain rental units and would sell ownership units to qualifying low- or moderate-income households.

OHV COURSE: See ATV Course

ORDINARY HIGH WATER (OHW):

(1) in the non-tidal portion of a river, lake or stream; the portion of the bed(s) and banks up to which the presence and action of the non-tidal water is so common and usual, and so long continued in all ordinary years, as to leave a natural line or "mark" impressed on the bank or shore and indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics;

(2) in a braided river, lake or stream; the area delimited by the natural line or "mark," as defined in part 1 above, impressed on the bank or shore of the outside margin of the most distant channels; or

(3) In a tidally influenced portion of a river, lake or stream, setbacks shall be taken from mean high water elevation or from the ordinary high water mark, whichever offers greater protection to the water body.

OVERCROWDING: A condition relation to the number of residents in a dwelling, defined by HUD, and measured by researchers in a variety of ways.

OVERLAY DISTRICT: Zoning requirements imposed in addition to or in place of those of the underlying zoning dis

development standards and procedures.

PEAK HOUR/PEAK PERIOD: When referring to vehicle travel, the daily period during which traffic volume is highest on a roadway, usually in the morning and evening commute periods.

PERFORMANCE STANDARD: Minimum requirement or maximum allowable limit on the effects or characteristics of a use, based on how the project is to be designed and/or operated.

PLANNED UNIT DEVELOPMENT (PUD): A form of housing development usually characterized by a unified site design and approval. A PUD may include clustered buildings, common natural and/or yard areas, increased density development, and a combination of building types and land uses. Planned unit development facilitates overall project planning and allows for the calculation of density for the entire development rather than on a lot-by-lot basis required under conventional land use regulations.

PLANNING AREA: In the context of this *Comprehensive Plan*, the air, land, and water resources within the CBJ. A Neighborhood Plan or Subarea Plan Study Area is of a smaller discrete planning area.

PLANNING PROCESS: Procedure related to land use by which a community sets goals, collects information, reviews alternatives, and approves a strategy, plan and implementation process to achieve those goals.

PREFABRICATED OR PANELIZED HOME: Factory-manufactured dwelling unit constructed to HUD safety standards and uniform building code specifications which is transported to a site and assembled on a permanent foundation. These do not include mobile homes, which are pre-1976 manufactured homes which do not meet HUD safety standards.

PUBLIC FACILITIES AND SERVICES: Projects, activities and facilities which a governmental jurisdiction determines to be necessary for the public health, safety and welfare, including but is not limited to water, sewage treatment and storm drainage systems; solid waste disposal; schools, libraries, and recreational facilities; police and fire protection; transit service; and medical and social services.

PUBLIC TRANSIT: Public transit refers to a public transit authority, or a non-profit organization that may contract with a public entity to provide transportation services to the public. In the CBJ, Capital Transit is the public transit provider and operates fixed route bus service. Care-A-Van provides the ADA-required complimentary public transport for qualifying mobility-impaired persons.

RECREATION FACILITIES, PUBLIC: Land in public ownership or subject to publicly-held easements or dedications which are permanently retained and managed for active recreation purposes such as playgrounds and playfields, marine vessel launch facilities, swimming pools, ice rinks, shooting ranges, and the like.

REMOTE AREAS: Lands located outside the Urban Service Area boundary and distant from a public road. Remote areas may be used for subsistence hunting and harvesting and for homestead homes or cabins but, generally, contain natural resources in need of protection from development.

RENEWABLE ENERGY: Energy generated from naturally renewable sources such as the sun, wind, water and the earth's heat.

RESIDENTIAL LAND: Zoned for dwelling units of all structural and ownership types, including single-family detached homes with or without accessory apartments, structures with attached dwelling units such as duplexes or apartments or condominiums, housing with shared kitchens such as the co-housing type or the Single Room Occupancy (SRO) type, manufactured home parks, float homes, and the like.

RIGHT-OF-WAY (ROW): A strip of land occupied or intended to be occupied by public utilities and/or transportation facilities, such as roadways, bicycle lanes, sidewalks, pathways, railways and utility lines.

RIPARIAN HABITAT: The ecosystem(s) near or situated on the bank of a river, stream, creek or other body of water. A riparian zone is the interface between land and a flowing surface water body. Plants along the water body margins are called riparian vegetation and these areas provide food and shelter for many aquatic animals, and their predators.

RURAL AREAS: Land located outside the Urban Service Area boundary accessible by a public road and which contain natural resources in need of protection from development, or areas unsuitable or not needed for urban development. In the CBJ, the *Comprehensive Plan* provides that urban services are not to be planned or extended to these areas.

RURAL DEVELOPMENT: Natural resource management and conservation activities and extremely low density residential uses, such as homestead cabins served by water wells and septic sanitary sewer systems and characterized by few public facilities and services and limited police, fire protection and emergency medical services.

SCALE AND MASSING: See MASS AND SCALE OF DEVELOPMENT

SCENIC CORRIDOR/VIEWSHED: Areas of land and/or waters within the CBJ from which views of off-site locations and features are offered and where these off-site features are deemed by the general public as an important or spectacular view which provide a sense of identity for the viewer.

SENSITIVE AREA: Areas with significant natural resource value, natural hazards, and/or scenic views that are designated for special management.

SENSITIVE HABITATS: Land or water area where sustaining the natural resource characteristics is important or essential to the production and maintenance of flora or fauna.

SENSITIVE RECEPTOR: A person or group of persons who are highly susceptible to the adverse effects of a negative effect of development, such air pollution, including noise.

SEPTIC SYSTEM: An on-site sanitary sewage disposal system consisting of a septic tank and a soil infiltration leach field or other approved disposal facility.

SHORELINE: Boundary between a body of water and the land, measured on tidal waters at mean higher high water and on non-tidal waterways at the ordinary high water mark. It includes intertidal areas and adjacent uplands.

SINGLE OCCUPANCY VEHICLE: A single occupancy vehicle (SOV) is a car, truck or similar motor vehicle that is occupied by one person, typically a commuter traveling to and from work.

SINGLE ROOM OCCUPANCY (SRO) DWELLING UNIT: A small dwelling unit of less than 400 net square feet which may or may not share a bathroom or kitchen with one or more adjoining similar unit(s), also referred to as a Compact Living Unit.

SNOWMOBILE COURSE: See ATV Course

SPECIAL NEEDS POPULATION: With respect to the provision of social services or affordable housing, Special Needs Populations include persons who are physically, mentally, and/or developmentally disabled; victims of domestic violence; homeless persons or those at-risk of becoming homeless, including youth; the elderly; single-parent households; chronic substance abusers; individuals exiting from institutional settings; chronically ill persons; persons disabled by HIV/AIDS or mental illness; and displaced teenaged parents (or expectant teenage parents), among others.

SPRAWL: Low-density, land-consumptive, auto-oriented development typically located on the outer fringes of the city or town center, such as the suburbs and more rural neighborhoods. This type of development requires costly extensions of roads, water, sewer, utilities and other infrastructure as well as the extension of community services such as garbage collection, police, fire suppression, emergency medical services and school and public transport services.

STREAM CORRIDOR: On CBJ-owned and other publicly-owned lands, and except on heavily modified streams, a baseline 200-foot-wide corridor on either side of an anadromous fish stream in which development is carefully controlled or, if necessary, prohibited to protect valuable habitat, scenic and/or recreational values.

SUBDIVISION: The act of legally dividing land into two or more lots.

SUBDIVISION REGULATION: Local ordinance which regulates the splitting of land into multiple lots, including requirements for streets, utilities, site design, and procedures for dedicating land for open space/natural areas or for public purposes and prescribing procedures for review.

SUBTIDAL: Below the level of mean lower low tide (MLLT).

SUBURBAN DEVELOPMENT: Residential, commercial, industrial, recreational and public uses which require a full complement of public utilities, infrastructure, services and facilities and for which the carrying capacity of those public utilities and services is adequate to serve the new development. See also SPRAWL

Tidal Marsh: Wetlands from lower high water (LHW) inland to the line of non-aquatic vegetation.

TIDELAND: Generally un-vegetated areas which are alternately exposed and covered by the falling and rising of the tide.

TITLE 49: See Land Use Code

Transit-Oriented Corridor (TOC): A land use or zoning overlay designation which allows a mixed, predominantly residential, development located within a five to ten-minute walking distance of public transit service. Typically, residential densities are high, neighborhood-serving commercial uses are provided at ground floor level of the development, and a parking requirement is greatly reduced or waived. Building heights on upland areas along bus routes may be taller to accommodate higher residential densities and affordable housing.

Transit-Oriented Development (TOD): Mixed use (including residential) development located within a five to ten-minute walking distance of public transit service. Typically, residential densities are high, neighborhood-serving commercial uses are provided at ground floor level of the development, and a parking requirement is greatly reduced or waived. Dwelling units are, typically, small and are suitable for single adults or couples, rather than families, due to the lack of active recreational space within the development. Transit-Oriented Development is also described by a set of design parameters in Chapter 3 of this *Plan*. Within the area designated on the Bonus-Eligible Area Overlay District Map, the design guidelines for TOD may be adopted as requirements for earning development or regulatory bonuses in the Land Use Code.

TRANSPORTATION CORRIDOR: Land used for transportation systems, classified as

ARTERIAL: Street intended to carry large volume of traffic at steady speeds with minimum interruptions to traffic flow. Private driveways should not access arterial roadways.

COLLECTOR: Street which forms the boundary of a major block of land and is intended primarily for inter-neighborhood traffic; can function as a feeder road to commercial areas or for shared access between subdivisions. Private driveways should not access arterial roadways.

LOCAL: Neighborhood-scale streets designed to provide vehicular access (driveways) to abutting properties.

PUBLIC/MASS TRANSIT: Land used for public common carrier passenger transportation service that is available to any person who pays a prescribed fare and which operates on established schedules along designated routes with specific stops (bus, light rail, rapid transit).

TRANSPORTATION DEMAND MANAGEMENT (TDM) PROGRAM: A program to reduce the demand on the road system by reducing the number of vehicles using the roadways and by increasing the number of persons per vehicle trip. The TDM reduces the number of persons who drive alone during the commute period and increases the number in carpools, vanpools, buses, walking and biking. A TDM program can include flexible work hours for staggered peak travel times, discounted bus fares during commute to work trips or within specific travel zones (say, from the Mendenhall Valley to downtown Juneau and back), increased parking rates for day-long parking in downtown, preferential parking for High Occupancy Vehicles (carpools, vanpools) and bicycles, along with parking restrictions for commuters in nearby residential neighborhoods.

UNIVERSAL DESIGN: Universal design consists of design and operating principles for buildings and spaces that meet the needs of all people, young and old, able and disabled by creating comfortable surroundings that suit a lifetime of changing needs for the occupants. Universal design features are generally standard building products or features that have been installed differently, selected carefully, or modified to allow ease of use by a larger population including children, elders, and people with disabilities. Some examples of universal building design include eliminating steps at building entrances, designing wider doorways and hallways, using lever or loop-type handle designs for doors and drawers that require no gripping or twisting to operate, placing light switches lower and electrical receptacles higher than usual above the floor.

URBAN DEVELOPMENT: Residential, commercial, industrial, recreational and public uses which require a full complement of public utilities, infrastructure, services and facilities and for which the carrying capacity of those public utilities and services is adequate to serve the new development.

URBAN SERVICE AREA OR URBAN SERVICE AREA BOUNDARY (USAB): In the CBJ, an area within the municipality that represents a legal, orderly expansion of urban development patterns where municipal services, particularly water and sewer service, is provided. Lands located within the CBJ Urban Service Area boundary designated on the Land Use Maps

of the *Comprehensive Plan* are deemed suitable for urban and suburban-scale development, for wh private utilities, roads, water systems, sewer systems, schools, police, fire, emergency medical care and other similar services are provided or are to be provided in the near future.

URBAN SPRAWL: See SPRAWL

VACANCY RATE: The percentage of housing units that are vacant at a given time.

VIEWSHED: See Scenic Corridor/Viewshed

VISITABILITY: See Universal Design

WATER-DEPENDENT USE: Use or activity which can be carried out only on, in or adjacent to water areas because the use requires access to the body of water. For example, a commercial fisheries ice plant, a barge landing for a drayage company, and eco-tourism marine tour vessels would require waterfront commercial or industrial lands. However, a bait shop, marine repair service or seafood processing may not require location along the waterfront. With the exception of houseboats, live-aboards, and float homes, residential uses do not require location along the waterfront and are, therefore, not deemed a water-dependent use.

WATER-RELATED USE: A use or activity which is not directly dependent upon access to a water body but which provides goods or services that are directly associated with water-dependence and which, if not located adjacent to water, would result in a public loss of quality in the goods or services offered. Such uses or activities could include kayak rental agencies, bait shops, marine equipment retail shops and other marine suppliers.

WATERSHED: The total area above a given point on a watercourse that contributes water to the flow of the particular watercourse; the entire region drains to that particular watercourse. It is also a land area that delineates the area which contributes to the drainage system of a particular water body, from its beginning or “headwaters” to its end or “mouth” or its juncture with another water body.

WETLANDS: Land areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (also known as fresh and salt water marshes or estuaries).

ZONING: Regulation of the use of land and the improvements on it for the protection of the public health, welfare and safety and which implement the land use policies and maps of this *Comprehensive Plan*. Zoning regulations establish standards for development and create different zoning districts or classification of land. In the CBJ, zoning regulations are adopted within Title 49, the Land Use Code.

ZONING MAPS: Zoning Maps are the official maps of the CBJ that identify the specific zoning districts located in the CBJ, and are adopted within Title 49, the Land Use Code.

APPENDIX B:
CREEKS, RIVERS & LAKES WITH ANADROMOUS FISHERY RESOURCES IN THE CBJ

Stream or Lake Name	Approximate Location	ADF&G Catalog Number
Unnamed Creek	Herbert River Trib.	110-50-10070-2004-3002-4017
Unnamed Creek	Herbert River Trib.	110-50-10070-2004-3002-4017-5004
Unnamed Creek	Herbert River Trib.	110-50-10070-2004-3002-4017-5008
Unnamed Creek	Herbert River Trib.	110-50-10070-2004-3002-4017-5008-6011
Unnamed Creek	Herbert River Trib.	110-50-10070-2004-3002-4021
Unnamed Creek	Herbert River Trib.	110-50-10070-2004-3002-4021-5004
Mendenhall Lake	Upper Mendenhall Valley	111-10500-0020
Unnamed Creek	Tracy Arm	111-21-10040
Prospect Creek	Port Snettisham	111-22-10100
Taku Lake Creek	Taku Harbor	111-31-10050
Taku Lake	Unnamed Creek Trib.	111-31-10050-0010
Carlson Creek	Taku Inlet	111-32-10130
Taku River	Taku Inlet	111-32-10320
Unnamed Creek	Taku River Trib.	111-32-10320-2004
Unnamed Creek	Twin Glacier Lake	111-32-10320-2010-0010-2006
Sockeye Creek	Taku River Trib.	111-32-10320-2013
Unnamed Creek	Sockeye Creek Trib.	111-32-10320-2013-3004
Johnson Creek	Taku River Trib.	111-32-10320-2016
Unnamed Creek	Johnson Creek Trib.	111-32-10320-2016-3005
Twin Glacier Creek	Taku River Trib.	111-32-10320-2019
Twin Glacier Lake	Unnamed Creek	111-32-10320-2019-0010
Unnamed Creek	Taku River Trib.	111-32-10320-2019-3006
Moose Creek .	Taku River Trib	111-32-10320-2021
Unnamed Creek	Moose Creek Trib.	111-32-10320-2021-3008
Unnamed Creek	Moose Creek Trib.	111-32-10320-2021-3008-4004
Unnamed Creek	Moose Creek Trib.	111-32-10320-2021-3012
Yehring Creek	Taku River Trib.	111-32-10320-2024
Unnamed Creek	Taku River Trib.	111-32-10320-2024-3004
Wright River	Taku River Trib.	111-32-10320-2032
Fish Creek	Taku River Trib.	111-32-10320-2052
Davidson Creek	Taku Inlet	111-32-10780
Unnamed Creek	Davidson Creek	111-32-10780-2010
Turner Creek	Taku Inlet	111-32-10800
Unnamed Creek	Slocum Inlet	111-32-10990
Unnamed Creek	Unnamed Creek Trib.	111-32-10990-2005
Unnamed Creek	Taku River	111-33-10080
Prospect Creek	Taku River	111-33-10100
Speel River	Tracy Arm	111-33-10300
Unnamed Creek	Speel River Trib.	111-33-10300-0010
Unnamed Creek	Speel River Trib.	111-33-10300-2014
Unnamed Creek	Port Snettisham	111-34-10200
Unnamed Creek	Port Snettisham	111-34-10220
Unnamed Creek	Port Snettisham	111-34-10240

Stream or Lake Name	Approximate Location	ADF&G Catalog Number
Unnamed Creek	Port Snettisham	111-34-10280
Whiting River	Port Snettisham	111-35-10050
Unnamed Creek	Whiting River	111-35-10050-2032
Unnamed Lake	Whiting River	111-35-10050-2032-0010
Unnamed Creek	Port Snettisham	111-35-10050-2035
Crescent Lake	Whiting River	111-35-10050-2035-0010
Unnamed Lake	Crescent Lake	111-35-10050-2035-0020
Unnamed Creek	Whiting River Trib.	111-35-10050-2035-3007
Unnamed Creek	Whiting River Trib.	111-35-10050-2035-3013
Unnamed Creek (West Creek)	Gastineau Channel, NE	111-40-10050
Unnamed Creek (West Creek)	Gastineau Channel, NE	111-40-10060
Switzer Creek	Gastineau Channel, NE	111-40-10070
Unnamed Creek	Switzer Creek Trib.	111-40-10070-2001
Unnamed Creek	Switzer Creek Trib.	111-40-10070-2003
Unnamed Creek	Switzer Creek Trib.	111-40-10070-2006
Unnamed Creek	Switzer Creek Trib.	111-40-10070-2013
Lemon Creek	Gastineau Channel, NE	111-40-10100
Unnamed Creek	Lemon Creek Trib.	111-40-10100-2029
Vanderbilt Creek	Gastineau Channel, NE	111-40-10125
Salmon Creek	Gastineau Channel, NE	111-40-10150
Gold Creek	Gastineau Channel, East	111-40-10200
Sheep Creek	Gastineau Channel, East	111-40-10280
Middle Creek	Douglas Island, West	111-40-10600
Unnamed Creek	Douglas Island, West	111-40-10690
Hilda Creek	Douglas Island, West	111-40-10700
Bullion Creek	Douglas Island, West	111-40-10850
Ready Bullion Creek	Douglas Island, West	111-40-10860
Lawson Creek	Douglas Island, East	111-40-10890
Kowee Creek	Douglas Island, East	111-40-10900
Grant Creek	Douglas Island, East	111-40-10910
Eagle Creek	Douglas Island, East	111-40-10920
Falls Creek	Douglas Island, East	111-40-10940
Neilson Creek	Douglas Island, NE	111-40-10960
Hendrickson Creek	Douglas Island, NE	111-40-10980
Eagle River	Lynn Canal	111-50-10070
Herbert River	Lynn Canal	111-50-10070-2004
Unnamed Lake	Herbert River	111-50-10070-2004-0010
Unnamed Creek	Amalga Harbor	111-50-10070-2004-3002
Unnamed Creek	Herbert River Trib.	111-50-10070-2004-3002-4007
Unnamed Creek	Herbert River Trib.	111-50-10070-2004-3002-4007-5004
Unnamed Creek	Herbert River Trib.	111-50-10070-2004-3002-4007-5010
Unnamed Creek	Herbert River Trib.	111-50-10070-2004-3002-4007-5010-6003
Unnamed Creek	Herbert River Trib.	111-50-10070-2004-3002-4007-5010-6009
Unnamed Creek	Herbert River Trib.	111-50-10070-2004-3002-4007-5010-6009-7003

Stream or Lake Name	Approximate Location	ADF&G Catalog Number
Windfall Creek	Herbert River Trib.	111-50-10070-2004-3006
Windfall Lake	Windfall Creek	111-50-10070-2004-3006-0010
Windfall Creek	Herbert River Trib.	111-50-10070-2004-3006-4003
Unnamed Creek	Herbert River Trib.	111-50-10070-2004-3006-4006
Boulder Creek	Eagle River Trib.	111-50-10070-2009
Unnamed Trib.	Eagle River Trib.	111-50-10070-2012
Unnamed Creek	Eagle River Trib.	111-50-10070-2018
Peterson Creek	Amalga Harbor	111-50-10100
Unnamed Creek	Salt Chuck Trib.	111-50-10110
Shrine Creek	Near Shrine Island	111-50-10140
North Tee	North Tee Harbor	111-50-10200
Lena Creek	Lena Beach	111-50-10300
Unnamed Creek	Lena Beach Rec. Area	111-50-10310
Auke Nu Creek	Auke Bay	111-50-10350
Waydelich Creek	Auke Bay	111-50-10370
Bay Creek	Auke Bay, Inner	111-50-10390
Auke Creek	Auke Bay, Inner	111-50-10420
Auke Lake	Auke Bay Vicinity	111-50-10420-0010
Unnamed Creeks	Auke Lake	111-50-10420-2002
Unnamed Creeks	Auke Lake	111-50-10420-2006
Lake II Creek	Auke Lake	111-50-10420-2008
Lake Creek	Auke Lake	111-50-10420-2010
Unnamed Creek	Auke Lake	111-50-10420-2013
Unnamed Creek	Auke Lake	111-50-10420-2013-3003
Unnamed Creek	Auke Lake	111-50-10420-2015
Unnamed Creek (Pederson Hill/ Casa del Sol Creek)	Mendenhall Peninsula	111-50-10490-2013
Unnamed Creek (Pederson Hill/ Casa del Sol Creek)	Mendenhall Peninsula	111-50-10490-2020
Unnamed Creek	Mendenhall Peninsula	111-50-10490-2020-3005
Mendenhall River	North Gastineau Channel	111-50-10500
Nugget Creek	Mendenhall Lake	111-50-10500-0020-2010
Duck Creek	Lower Mendenhall Valley	111-50-10500-2002
Unnamed Creek	Duck Creek Trib.	111-50-10500-2002-3014
Unnamed Creek	Duck Creek Trib.	111-50-10500-2002-3030
Montana Creek	Mendenhall River, North	111-50-10500-2003
Unnamed Creek	Montana Creek Trib.	111-50-10500-2003-3014
Unnamed Creek	Montana Creek Trib.	111-50-10500-2003-3018
Unnamed Creek	Montana Creek Trib.	111-50-10500-2003-3024
Stream or Lake Name	Approximate Location	ADF&G Catalog Number
Unnamed Creek	Montana Creek Trib.	111-50-10500-2003-3042
Unnamed Creek	Montana Creek Trib.	111-50-10500-2003-3054
McGinnis Creek	Montana Creek	111-50-10500-2003-3060
Unnamed Creek	Montana Creek	111-50-10500-2003-3060-4011

Stream or Lake Name	Approximate Location	ADF&G Catalog Number
Dredge Lake Creek	Upper Mendenhall Valley	111-50-10500-2004
Unnamed Creek	Dredge Lake Area	111-50-10500-2004
Unnamed Creek	Dredge Lake Area	111-50-10500-2004-3011
Unnamed Creek	Dredge Lake Area	111-50-10500-2004-3011-4003
Unnamed Creek	Dredge Lake Area	111-50-10500-2004-3011-4003-5002
Unnamed Creek	Dredge Lake Area	111-50-10500-2004-3011-4007
Unnamed Creek	Dredge Lake Area	111-50-10500-2004-3011-4013
Unnamed Creek	Dredge Lake Area	111-50-10500-2004-3020
Steep Creek	Mendenhall Lake	111-50-10500-2006
Unnamed Creek	Lynn Canal	111-50-10600
Jordan Creek	Lower Mendenhall Valley	111-50-10620
Johnson Creek	Douglas Island, NE	111-50-10660
Nine-mile Creek	Douglas Island, North	111-50-10670
Fish Creek	Douglas Island, North	111-50-10690
Peterson Creek (Outer Point Creek)	Douglas Island, NW	111-50-10750
Unnamed Creek	Douglas Island, NW	111-50-10750-2027
Unnamed Creek	Peterson Creek Trib.	111-50-10750-2033
Unnamed Creek	Peterson Creek Trib.	111-50-10750-2035
Unnamed Creek	Peterson Creek Trib.	111-50-10750-2039
Unnamed Creek	Peterson Creek Trib.	111-50-10750-2042
Limestone Creek	Limestone Inlet	111-90-10050
Unnamed Creek	Limestone Inlet Creek Trib.	111-90-10050-2005
Bridget Cove Trib.	Bridget Cove	115-10-10230
Bessie Creek	Lynn Canal	115-10-10250
Johnson Creek	Berners Bay	115-20-10070
Berners River	Berners Bay	115-20-10100
Unnamed Creek	Berner's River Trib.	115-20-10100-2006
Unnamed Creek	Berner's River Trib.	115-20-10100-2006-0010
Unnamed Creek	Berner's River Trib.	115-20-10100-2009
Unnamed Creek	Berner's River Trib.	115-20-10100-2015
Lace River	Berners Bay	115-20-10200
Unnamed Creek	Lace River Trib.	115-20-10200-2016
Antler River	Berners Bay	115-20-10300
Gilkey River	Antler River Trib.	115-20-10300-2004
Sawmill Creek	Berners Bay, East	115-20-10520
Unnamed Creek	Echo Cove	115-20-10590
Cowee Creek	Echo Cove, West	115-20-10620
Davies Creek	Cowee Creek Trib.	115-20-10620-2003
Cowee Creek, S. Fork	Cowee Creek Trib.	115-20-10620-2006
Unnamed Creek	Lynn Canal, North	115-31-10300
Sherman Creek	Lynn Canal, North	115-31-10330
Sweeny Creek	Lynn Canal, North	115-31-10350

APPENDIX C:
ACRONYMS AND ABBREVIATIONS USED IN THE *PLAN*

Acronym or Abbreviation	Full name
ADA	Americans with Disabilities Act federal law
AEL&P	Alaska Electric Light and Power Company
ADF&G	Alaska Department of Fish and Game
AHFC	Alaska Housing Finance Corporation
AMI	Area Median Income
ANCSA	Alaska Native Claims Settlement Act
ATV	All Terrain Vehicle
AWARE	Aiding Women in Abuse and Rape Emergencies (a local shelter and advocacy group)
AWTP	The adopted CBJ Area Wide Transportation Plan
BE	Bonus Eligible area land use overlay designation
BMPs	Best Management Practices
BMX	A type of off-road bicycle
BRT	Bus Rapid Transit system
C	Commercial land use map designation
CA	Conservation Area land use map designation
CBD	Central Business District
CBJ	City & Borough of Juneau: Depending on context of use, this may mean the CBJ government or the CBJ as the geographic area subject to this *Plan*
CCF/R	Capital City Fire/Rescue (Fire Department)
CDBG	Community Development Block Grant
CDD	The CBJ Community Development Department
CIP	The CBJ Capital Improvement Program
CMT	Crisis Management Team in CCF/R
Corps	United States Army Corps of Engineers
DEC	The Alaska Department of Environmental Conservation
DG	Comp Plan Policy Development Guideline
ADOT&PF	Alaska Department of Transportation and Public Facilities
EMT or EMTs	Emergency Medical Technicians
EPA	The United States Environmental Protection Agency
FAA	The United States Federal Aviation Administration
FAR	Floor to Area Ratio; or, Federal Aviation Regulations (depending on context)
FEMA	The United States Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	Geographic Information System of mapping community resources
GPS	Global Positioning System
HA	Hazard Area land use map designation
LI	Light Industrial land use map designation
HDR	High Density Residential land use map designation
HI	Heavy Industrial land use map designation

HOV	High Occupancy Vehicle
HRAC	The CBJ Historic Resources Advisory Committee
HUD	The United States Department of Housing and Urban Development
IA	Comp Plan Policy Implementing Action
IPU	Institutional Public Use land use map designation
JWMP	Juneau Wetlands Management Plan
JEDC	Juneau Economic Development Council
JPD	Juneau Police Department
JNU	Juneau International Airport
LCBLMP	Last Chance Basin Land Management Plan
LEED	Leadership in Energy and Environmental Design standards
LI	Light Industrial land use map designation
LID	Local Improvement District
LOS	Level of Service
LRWP	The CBJ adopted *Long Range Waterfront Plan*
MAP-21	Moving Ahead for Progress in the 21st Century; a piece of federal transportation legislation that replaced SAFETEA-LU in 2012
MC	Marine Commercial land use map designation
MDR	Medium Density Residential land use map designation
MDR/SF	Medium Density Residential/Single Family land use map designation
MLLT	Mean Lower Low Tide level
MMU	Marine Mixed Use land use map designation
NOAA	National Oceanic & Atmospheric Administration
NP	Natural Area Park land use map designation
OHV	Off-Highway Vehicle
OHWM	Ordinary High Water Mark of water bodies
P&RD	The CBJ Parks and Recreation Department
PUD	Planned Unit Development
RAC	Residential Units per Acre/number of dwelling units allowed per increment of land as a density descriptor
RD	Resource Development land use map designation
RDR	Rural Dispersed Residential land use map designation
REC	Recreation Resource land use map designation
RLDR	Rural Low Density Residential land use map designation
RNP	Required Navigational Performance for the airport
RS	Recreational Service Park land use map designation
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (a piece of federal transportation legislation, replaced with MAP-21 in 2012)
SC	Stream Protection Corridor land use map designation
SCV	Scenic Corridor/Viewshed land use map designation
SOP	Comp Plan Policy Standard Operating Procedure
SOV	Single-Occupancy Vehicle
SRO	Single Room Occupancy type of residential unit or development
STIP	Alaska State Transportation Improvement Program
TMDL	Total Maximum Daily Load of pollutants in a water body

TOC	Transit Oriented Corridor
TOD	Transit Oriented Development
TSA	Transportation Security Administration
TTC	Traditional Town Center land use map designation
UA	University of Alaska; in this *Plan*, UA refers to UAF and UAS, which have facilities in Juneau, not UAA, which has no facilities in Juneau
UAF	University of Alaska Fairbanks
UAS	University of Alaska Southeast
ULDR	Urban Low Density Residential land use map designation
USAB	Urban Service Area boundary
WCF	Wireless Communications Facility
WCI	Waterfront Commercial/Industrial land use map designation
WRB	The CBJ Wetlands Review Board
WS	Watershed land use map designation

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Sustainability Indicators Project DRAFT 4/16/2012 Steve B, comments NJW

During 2011 the JCOS began a project to identify "sustainability indicators". Policy 2.3 of the 2008 Comprehensive Plan states that "It is the policy of the CBJ to develop and use sustainability indicators to measure Juneau's progress toward becoming a more sustainable community". The Plan further establishes a Standard Operating Procedure (2.3.SOP1) "Measure CBJ capital improvements, projects, ordinances, and purchases against adopted sustainability indicators to ensure that the CBJ is moving toward a sustainable future."

Chapter 2 of the Plan directs the JCOS to develop sustainability Indicators. It notes that their development begins by "selecting important, diverse, measurable categories and topics that the community will commit to measure at regular intervals", and that they will be developed "from ongoing issues that emerge in the community".

In January 2011 the JCOS began this work by reviewing a broad range of approaches and possible sustainability indicators. Over the following months we focused our efforts on the "Implementing Actions" identified in Section 2 of the 2008 CBJ Comp Plan. These include a range of social, economic, and environmental areas (Sections 2.1.IA3 through 2.1.IA12, and 2.2IA1 through 2.2.IA6); about two-thirds of them deal with energy use and energy conservation.

Given the significance of energy in the Plan, and to the community, we decided to further focus our initial efforts on identifying appropriate indicators related to energy use. We were greatly aided in this by the development of the Juneau Climate Action and Implementation Plan (JCAP) during 2011. The JCAP compiles data on energy use and greenhouse gas emissions in Juneau for 2010 and compares it with baseline data from 2007. It also recommends a goal of reducing GHG emissions by 25% by 2032, and sets out a series of implementation actions for achieving this goal. In November, 2011, the CBJ Assembly adopted the JCAP (Resolution 2593).

We recommend that the CBJ Assembly adopt the following three sustainability indicators relating to energy:

1)Fossil fuel use
2)Renewable energy use
3)Greenhouse gas emissions

1) Fossil fuel use. This indicator is measured as MMBtu's (millions of British thermal units) of fossil fuel used annually. The JCAP provides a methodology for measuring petroleum energy use. The burning of petroleum fuels generates about 75% of local energy used in Juneau, mostly for transportation and heating. Juneau is highly dependent on oil for heating, and the economies of households, businesses and agencies are affected by fuel oil costs. . It also breaks out data by CBJ government activities, as well as the community as a whole.

2) Renewable energy use. This indicator is measured as MMBtu's of renewable energy used annually. The JCAP provides a methodology for measuring this. Hydropower provides much of Juneau's electricity, and about 25% of the total energy consumed in the borough.

3) Greenhouse gas emissions. This indicator is measured as metric tons of carbon dioxide equivalent (MTCO2e). The JCAP provides a methodology for measuring GHG emissions, and sets a specific goal for reduction of GHG (25% reduction by 2032).

We recommend annual data collection and report to the Assembly by ?.

Accountable Implementation (APA Guidelines)

8.1 Indicate specific actions for implementation.

8.2 Connect plan implementation to the capital planning process.

8.3 Connect plan implementation to the annual budgeting process.

8.4 Establish interagency and organizational cooperation.

8.5 Identify funding sources for plan implementation.

8.6 Establish implementation indicators, benchmarks, and targets.

8.7 Regularly evaluate and report on implementation progress.

8.8 Adjust the plan as necessary based on the evaluation

Source: Godschalk and Rouse. 2015. *Sustaining Places: Best Practices for Comprehensive Plans PAS Report 578.* American Planning Association. Retrieved 6 January 2019 from http://www.joslynutc.org/apa_sustaining_places.pdf.

Table __.3. *Phases of Whitehorse's Sustainability Planning.* Three phases categorize the development of sustainability planning and indicator development using the City of Whitehorse's planning documents. The table lists each phase with relevant documents and dates and a short description.

Phases of Sustainability Planning and Implementation	Planning and Sustainability Policy Documents	Major Contents
Phase 1 Vision and Principles	2002 Official Community Plan (OCP)	The first time a sustainability vision with seven principles was included in a city planning document. The OCP, which is periodically updated, is largely a land use document reflecting community aspirations.
Phase 2 "New Deal for Cities and Communities" Integrated Framework	2007 Integrated Community Sustainability Plan (ICSP) – a guide to infrastructure investment.	Funded under the Federal Gas Tax Agreement, 2005-2015, the plan continued to focus on areas of emphasis. Ten priority areas were targeted for action. Based on community consultation, the plan proposed 87 actions, with a goal to complete 75 by 2014.
	2008 Strategic Sustainability Plan (SSP) – Engaged the public on values and issues beyond infrastructure.	Building on the ICSP, the city adopted its Strategic Sustainability Plan and hosted a four-day Sustainability Charrette.
Phase 3 Measures and Monitoring	2010 Official Community Plan (OCP) - Amended	"Aims to integrate sustainability into City operations and decision-making." Wilderness highly valued, with nearly 60% of the land within the city boundary reserved for greenspace.
	2010 Sustainability Achievements, Sustainability Trends	Seven sustainability goals with an analysis of trends.
	2011 & 2012 Strategic Sustainability Plan Highlights Summary	Progress report on Seven Key Principles.

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Measuring Progress in Circumpolar Cities

Edited by Robert W. Orttung

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Preface

The purpose of this book is to advance efforts to measure sustainability in Arctic cities in the circumpolar north. Ultimately, we hope to apply the 128 indicators listed by the International Organization for Standardization (ISO) in its ISO 37120 (Sustainable cities and communities—Indicators for city services and quality of life) to approximately fifty cities in the Far North. ISO published the first version of the standard in 2014 and a revised version in 2018. We have not succeeded in collecting the 6,500 pieces of data for that analysis yet. The chapters in this book move in that direction by testing how some of the key indicators work in various case study cities. As a stepping-stone to the larger comprehensive analysis, these chapters give in-depth discussions of various aspects of urban sustainability—from energy use to culture-promoting institutions—in a variety of real-world circumstances. These bits and pieces of the larger comprehensive analysis provide a collection of insights designed to illuminate how relevant the international standard for urban sustainability is for cities in the Far North, providing guidance before we apply the 128 indicators to the fifty cities in a comprehensive manner.

We start with the assumption that the ISO standard can apply to the cities of the Far North even if the authors of the standard were not specifically thinking of these cities. However, as the chapters show, the standard often falls short and we identify some places where understanding sustainability in the North requires going beyond the set of indicators included in ISO 37120.

This book is one of the outputs of our Arctic project, which is part of the Partnerships for International Research and Education (PIRE): Promoting Urban Sustainability in the Arctic, which was funded by

the National Science Foundation (NSF; Award 1545913). Part of the funding for this work comes from support that the Academy of Finland provided in funding a related project, Promoting Urban Sustainability in the Arctic (no: 299258).

Frequently we refer to this collective enterprise as the Arctic PIRE project. The project, currently funded for a five-year period from 2016 to 2021, is a multidisciplinary, multinational collaboration based at the George Washington University. US partners include the University of Virginia, the Massachusetts Institute of Technology, the University of Northern Iowa, and the University of Alaska. International partners include the University of Helsinki, Moscow State University, the State Hydrological Institute in Saint Petersburg, and the Norwegian Institute for International Affairs. Disciplinary specialists involved represent the fields of political science, physical and human geography, sociology, economics, architecture, urban planning, and climatology. We have also made a strong effort to incorporate young faculty as well as both graduate and undergraduate students into the project in order to provide some hands-on training to the next generation of natural and social scientists. Similarly, where possible we have reached out to policymakers in an effort to gain a better understanding of their concerns and find ways that our research can address important issues.

The central research task is gathering the data to measure the 128 indicators for the fifty cities. That is an ongoing process and the first set of results are described here. As this book shows, we are trying to combine a robust quantitative analysis with a variety of case studies, interviews, and research trips to put the numerical data in the context of lived reality. Other elements of the project include outreach to K–12 students as part of a project called #60above60 that gives students in various northern and nonnorthern locations an opportunity to share sixty-second videos about their cities and how they would go about addressing local sustainability issues. We conducted two summer field trips, one in 2017 and one in 2019, visiting the cities of Salekhard and Vorkuta in Russia, Anchorage and Fairbanks in Alaska, and Whitehorse in Canada, with a group of faculty and students. Project participants have also worked with the Fairbanks Sustainability Commission to help develop both a sustainability plan and improved communication to encourage progress in the areas of food security, energy efficiency, and solid waste management.

This book builds on the analysis published in an earlier volume *Sustaining Russia's Arctic Cities: Resource Politics, Migration, and Climate Change.* That earlier book focused on Russia and laid out the

key challenges that Arctic cities are addressing as they try to improve their levels of sustainability. This volume is a necessary step that will lead, ultimately, to a comprehensive analysis of sustainability in Arctic cities. The conclusion discusses ongoing efforts in that direction.

Robert W. Orttung

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We would like to thank the National Science Foundation (NSF) for funding our Arctic project, which is part of the Partnerships for International Research and Education (PIRE): Promoting Urban Sustainability in the Arctic (Award 1545913). The NSF funding provided an overall umbrella for the research reported here. In addition, many of the scholars had additional grants that supported their particular work. The relevant individual chapters acknowledge those sponsors. These funders include the National Science Foundation, the Russian Geographical Society, and the Russian Foundation for Basic Research.

Part I

Urban Sustainability in the Arctic

INTRODUCTION

Measuring Urban Sustainability in Arctic Conditions

Robert W. Orttung and Luis Suter

Cities have taken on a new significance since the beginning of the twenty-first century, with more than half the global population now living in urban centers. Although cities make up only 3 percent of the world's landmass, the United Nations estimates that in 2018 urban populations accounted for 55 percent of the global population, with that number constantly rising (United Nations Department of Economic and Social Affairs Population Division 2019). The growth of the world's cities has led to growing concerns about urban sustainability and invigorated efforts to define and measure this concept (Science for Environment Policy 2015). Most prominently, the United Nations' seventeen Sustainable Development Goals (SDGs) adopted in 2015 includes SDG 11, "Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable," which focuses specifically on cities and communities.

Despite its remote location, the Arctic has long participated in the global urbanization trend. A majority of the Arctic population resides in urban environments; the region has seen urban growth in resource-rich areas even as the populations in other parts of the Arctic shrink (Dybbroe 2008; Heleniak 2010, 2013; Howe 2009). As Carrie Schaffner's chapter in this volume shows, expanding cities provide housing, jobs, and education for human populations (Glaeser 2011), but also impart negative effects such as pollution, encroachment on open land, and contributions to impacts on the surrounding natural environment far beyond the settlement limits (McKinney 2008). The

Arctic region is particularly sensitive since average temperatures there have risen much more quickly than the global rate over the past fifty years (Arctic Monitoring and Assessment Programme 2017). The changing climate has spurred an interest in measuring the state of the Arctic urban centers, those centers' efforts to promote sustainability, and the efficacy of such efforts. It is imperative to properly assess the extent of the challenges these cities face and the effectiveness of the policies they implement in response to the challenges in order to estimate their ability to survive into the future.

The purpose of this chapter is to introduce a method for measuring the sustainability of Arctic cities. Originally, the project team sought to develop its own Arctic Urban Sustainability Index that would best fit Arctic conditions. The effort was based on the thinking that the Arctic is sufficiently different from the rest of the globe that it deserves its own index. That task proved difficult to execute, however: The assembled multidisciplinary, multinational team had difficulty agreeing on which indicators should be included in the index and how to condense this list down to a top ten that would most effectively inform policymakers. At the same time, a review of the project by National Science Foundation (NSF) auditors suggested that the best way to move forward was simply to apply the international standard for urban sustainability developed by the International Organization for Standardization (ISO)—ISO 37120. The ISO is a nongovernmental international organization linking 164 national bodies that has published nearly 23,000 standards, covering a range of products, services, and systems.

ISO 37120, described in more detail below, is intended to apply to all cities on the planet. It seeks to be an international set of indicators designed to measure and promote sustainability while creating a uniform standard that makes it possible to compare experiences across cities. Use of this standard allows our project to test how well it applies in the extreme conditions of the Far North, and identifies areas where the standard falls short, for example in addressing issues such as remoteness and permafrost. Another benefit of working with ISO 37120 as opposed to a specific Arctic index is that it integrates our work and the Arctic cities into a global conversation in which all cities are measured by the same standard. To the extent that Arctic cities are different from other cities, comparing them across similar measures makes it possible to gauge the level of difference.

This chapter proceeds as follows: First, we define urban sustainability. Then we briefly trace the history of urban sustainability indicators. Building on this discussion, we discuss the creation of ISO 37120 and

then examine how it can be applied to Arctic cities. After examining issues of data collection, we then place ISO 37120 in the context of other sets of indicators that have been drawn up to apply to Arctic circumstances. Finally, we provide a roadmap for the book. Although this volume cannot comprehensively test ISO 37120 in Arctic conditions, it provides an in-depth examination of some of the indicators in the context of a variety of case study cities.

Defining Urban Sustainability

Our definition of a sustainable city draws on the foundational statements that stress the use of resources in a way that does not impinge on the living standards of future generations (World Commission on Environment and Development 1987). Sustainability is holistic and highlights the many integrative links among its constitutive components (Dale 2012; Matson, Clark, and Andersson 2016). In the case of ISO 37120 these components range across nineteen categories, from economic vitality to wastewater management. Concerns that previous work did not take full account of the world's complexity and the level of interactions among its systems have led universities to encourage increased multidisciplinary studies from their faculty (Brown, Deletic, and Wong 2015), caused funding agencies like NSF to support research on nexus issues that exist at the interfaces of several systems (e.g., the food-energy-water nexus), and encouraged the National Academy of Sciences to study ways to promote team science (Cooke and Hilton 2015).

Sustainability indicators are collections of specific measurable characteristics of society and nature that measure the various components of social, economic, and environmental quality (Reed, Fraser, and Dougill 2006). They are distinguishable from simple environmental, economic, or social indicators by the way they are integrated and developed with input from multiple stakeholders (Maclaren 1996). Most importantly, the sustainability indicators should not give a snapshot of current conditions, as other indicators do, but instead should provide a sense of whether a city is using its resources in a manner that will allow it to continue to develop into the future.

Despite the considerable work addressing sustainable cities, there are "no mature models of urban sustainability" available today whether in the Arctic or the rest of the planet (Gardner 2016: 3). Even though ISO 37120 lays out a clear set of indicators, there is little agreement about what components are necessary for a sustainable

city and the necessary relationship among these components. In fact, "a sustainable Riyadh will look and operate differently from a sustainable Reykjavik," given the entirely different contexts in which they are located (Gardner 2016: 3).

Previous attempts to develop indexes and ranking systems of all sorts have often run into trouble. According to one recent survey of the field, they are "often incoherently defined, anchored in confused and untested theories, measured idiosyncratically, and subject to manipulation by both the raters and the rated, leading to unintended, unwanted consequences" (Snyder and Cooley 2015: 179). Moreover, it is important to take into account ethical considerations in determining what is counted and who is doing the counting, thereby seeking to remember and articulate what is left out (Stone 2018). In a practical sense, indicators are typically a simple way to measure a complex situation and are most effective in starting a conversation rather than in producing a comprehensive assessment (Mair et al. 2018). Despite these clear limitations, we think it useful to set a baseline, measure progress, and identify best practices in the pursuit of urban sustainability in Arctic conditions.

Brief History of Urban Sustainability Indicators

Given the holistic and future-oriented approach that sustainability requires, how is it possible to measure sustainability in quantitative terms? The Rio Earth Summit of 1992 began to address the lack of assessment capacity by publishing Agenda 21, which included a call (in chapter 40), for the development of sustainability indicators (United Nations Conference on Environment & Development [UNCED] 1992). Since the Agenda 21 call in 1992, hundreds of indexes have appeared, ranging widely in scope and scale (Parris and Kates 2003). Twenty years later, the 2012 Rio+20 Earth Summit stressed practical measures for achieving sustainability through the building of green economies and green development pathways in developed and developing countries alike. The idea was to ensure robust economic performance in the developed and developing worlds while also taking into account environmental and social concerns.

The Conference of Parties (COP) meeting in Paris, called COP21 or the 2015 Paris Climate Conference, was even more focused on the actual implementation of policies, with each member country submitting individual plans on how to promote country-level sustainability goals. The seventeen UN SDGs, adopted in 2015 with a target of 2030

provide a comprehensive set of guideposts, addressing issues ranging from poverty to the state of the oceans. While the UN identified seventeen discrete SDGs, the enterprise stresses the interconnectedness of the goals and the need to work on them simultaneously. SDG 11 of this ambitious development plan addresses communities and cities, calling for improvements in environmental stewardship, the building of more-inclusive societies, and long-term planning to continue economic growth without adversely affecting the planet or disadvantaged peoples. SDG 11 seeks to take a more integrated approach than previous efforts by focusing on universal access to adequate, safe, and affordable housing; public transportation; participatory and integrated planning and management, especially with regard to inclusion, resource efficiency, mitigation and adaptation to climate change, and resilience to disasters; protection of cultural and natural heritage; reduction of deaths due to disasters; reduction of adverse environmental impacts from air pollution and solid waste; access to green public spaces; positive economic, social, and environmental links between urban, peri-urban, and rural areas; and the offer of support to developing countries in creating green buildings with the use of local materials to reduce environmental impact.

Creating ISO 37120

Although the SDGs are more noticeable, the ISO 37120 is the first international standard on city metrics and it is more comprehensive in its scope of analyzing urban sustainability. ISO published the first version in 2014 (ISO 2014) and a revised version in the summer of 2018. ISO 37120 is based on the broadly used Global City Indicators Facility project, which included more than 255 cities across eighty-two countries. The World Bank set up this project in 2007 and it is now housed at the University of Toronto, which hosts an on-line database seeking to make the data for the participating cities available (World Council on City Data n.d.).

ISO 37120 2014 included 115 indicators organized into twenty themes (ISO 2014). Of the 115 indicators, 31 were considered to be core, and to require reporting from all participating cities. The other indicators were considered to be supplementary, and to require reporting when available. The core indicators each fulfill the following conditions: They are reportable annually, comparable, relevant to public policymaking, cost effective to collect, understandable, and not overly complex. The revised 2018 version of the ISO 37120 included

Table 0.1. | *ISO 37120 core, supporting, and profile indicators*

Theme	Core indicators	Supporting indicators	Profile indicators
Economy	1	7	3
Education	4	2	0
Energy	5	2	2
Environment and climate change	3	6	0
Finance	2	2	2
Governance	1	3	0
Health	4	2	0
Housing	2	2	6
Population and Social Conditions	1	2	6
Recreation	0	2	0
Safety	5	5	0
Solid Waste	5	5	0
Sport and Culture	1	2	0
Telecommunications	0	2	0
Transportation	2	5	2
Urban/Local Agriculture and Food Security	1	3	0
Urban Planning	1	3	3
Waste water	3	1	0
Water	4	3	0
Total	*45*	*59*	*24*

128 indicators of which 45 were core indicators, for nineteen domains of sustainability—economy; education; energy; environment and climate change; finance; governance; health; housing; population and social conditions; recreation; safety; solid waste; sport and culture; telecommunication; transportation; urban/local agriculture and food security; urban planning; wastewater; and water (ISO 2018). Table 0.1 summarizes the key components of the standard. In addition to the forty-five core indicators, there are fifty-nine supporting indicators and twenty-four profile indicators. The ISO requires cities to collect data on the core indicators to participate in the measurement process, recommends collecting the supporting indicators, and suggests collecting the profile indicators as background information. The number of core indicators ranges from zero to five for the nineteen topics.

Applying ISO 37120 to Arctic Cities

As noted in the preface, we have not been able to collect all the data required to fully measure the approximately fifty Arctic cities

described in chapter 1 that make up the heart of this project. Instead, the chapters in this book seek to test out a few of the indicators on a variety of case study cities.

By applying ISO 37120 to some of the most extreme situations on the planet we can stress test the list of indicators included in it and determine whether these indicators are in fact the best available for measuring urban sustainability and if they make sense in Arctic conditions. If they do not give us good data about the Arctic cities, perhaps the standard is not effective for other cities either. Our conclusions on the application of ISO 37120 to Arctic cities will generate new voices in the broader international conversation about how best to measure urban sustainability. Of course, it might eventually turn out that cities are not all alike, so that some components of the ISO index are more universal than others (Smith 2019). Beyond the Arctic/non-Arctic distinction, there may be strong differences between developed and less-developed cities, tropical and temperate cities, and coastal and inland cities. Our findings will fit into the broader context of this discussion.

Naturally, we do not plan to accept ISO 37120 uncritically and many of the chapters in this book provide extensions to the ISO. This introductory chapter provides a brief introduction to ISO 37120, and the book's Conclusion ties together the numerous themes raised by each of the specific chapters. The chapters in this book examine how well a select group of indicators work for a variety of case study cities.

Data Collection

A central concern in measuring the indicators is data collection. The authors of ISO 37120 specifically sought to define core variables that are reportable annually, comparable, relevant to public policy-making, cost effective to collect, understandable, and not overly complex. Currently, there are no widely accepted standards among city governments identifying which data they should collect. City governments around the world gather different data; even when data is collected on similar topics, such as housing, the numbers often are not comparable across countries. The Arctic region spans eight countries whose cities have different methods and schedules for collecting information on their economies, societies, and environments. The diversity, both within cities and across the circumpolar north, is extenuated by the variability in social, political, and economic systems within the Arctic.

Even when the data is available, questions remain about what it is actually telling us. For example, if we have a number measuring a specific aspect of sustainability for a city, does that number tell us about the entire city? In other words, will an indicator hold true across the entire urban area, or is it specific to a single neighborhood or to several subregions within the city? In theory, an indicator must be able to represent an entire urban area, but cities are inherently patchy and diverse (Grove et al. 2015). The result is that, even when we have a number for a city, it might not tell us much about the level of variety across the city in the dimension it is measuring.

Europe boasts the most urban sustainability indicators of any region in the world, and these indexes often focus on different aspects of sustainability. The richness of these indexes results largely from the resources of the Eurostat data collection agency. This institution provides standardized data collection methods, taking in the same measures across many countries. This centralized data center has made it easy to design and test the functionality of many different indexes, and provides historical data with which to validate the accuracy of measures. Unfortunately, Arctic cities do not have a similar system in place that is well developed enough to serve our purposes. The Arctic Council publishes papers using this type of internationally standardized data, but it does not always publish the data that the research was based on. On 28 March 2016 NSF created the Arctic Data Center (http://arcticdata.io/), and we hope eventually to publish the data generated by this project there.

Existing Arctic Indicators

Before diving into our analysis of urban sustainability in Arctic cities using ISO 37120, we here briefly describe previous efforts to measure the sustainability of Arctic cities. To date, Arctic researchers have started developing indicators, but they have not yet focused specifically on urban sustainability. Arctic indicators first emphasized social and environmental concerns and were associated with the need of Arctic communities and policymakers to resolve the complex problems associated with climate change. But the process of developing useful indicators is still in early stages of development. A recent survey of Arctic sustainability research called for sustainability indicators that better link social and ecological processes (Petrov et al. 2015: 9). Additionally, there is a need for greater knowledge about urban areas in the Arctic since the existing "sustainability literature pays negligible

attention to urban areas and urban-rural relationships" (Petrov et al. 2015: 11). A key task for the proposed Agenda 2025 is the design of sustainability indicators and monitoring systems (Petrov et al. 2015).

One of the most prominent efforts to develop a set of indicators for the Far North so far has been the Arctic Social Indicators (ASI) project. This effort began in 2006 in response to the publication of the *Arctic Human Development Report,* the first social sciences/humanities report commissioned by the Arctic Council. That report declared, "The SDWG [Sustainable Development Working Group] should organize a workshop to devise a small number of indicators to be used in monitoring or tracking changes in human development in the Arctic over time" (Einarsson et al. 2004: 11). As a result, for the first time Arctic scholars sought systematic ways to measure "social, economic and cultural trajectories of change" (J. Larsen, Schweitzer, and Petrov 2014). They were particularly concerned that life in the Arctic was different from life elsewhere, and therefore sought to add new categories to existing indexes such as the United Nations Human Development Index, including fate control (see chapter 6 of this volume), cultural integrity, and contact with nature (Einarsson et al. 2004: 11). The first Arctic Social Indicators report, published in 2010, included six general domains to measure:

1. Health and Population
2. Material Well-Being
3. Education
4. Cultural Well-Being
5. Contact with Nature
6. Fate Control

The report went on to develop seven indicators within these six domains:

1. Infant Mortality (Domain: Health/Population)
2. Net-migration (Domains: Health and Population; Material Well-Being)
3. Consumption/harvest of local foods (Domains: Contact with Nature; Material Well-being)
4. Per capita household income (Domain: Material Well-being)
5. Ratio of students successfully completing postsecondary education (Domain: Education)
6. Language retention (Domain: Cultural Well-Being)
7. Fate Control Index (Domain: Fate Control)

(J. N. Larsen, Schweitzer, and Fondahl 2010: 153–54)

Criteria for including these particular indicators included "data availability, data affordability, ease of measurement, robustness, scalability and inclusiveness" (J. Larsen et al. 2014: 33).

On the basis of the Arctic Social Indicators, the team commissioned a series of case studies to test the usefulness of the indicators. As the final report, published in 2014, points out, the indicators were focused on Indigenous peoples living in the Arctic and have less to tell us about non-Indigenous people living there. "Although ASI-I insists that the ASI framework must apply to both Indigenous and non-Indigenous Arctic residents, the nature of the data and indicators themselves in the Cultural Vitality, Contact with Nature, and Fate Control domains allow measuring wellbeing of Indigenous people and often precludes us from considering other groups. This is a major limitation in many case studies presented in the current report" (J. Larsen et al. 2014: 46).

Another limitation was that "significant data challenges and incompatible units of measurement across national and administrative borders prohibit the application of ASI indicators to all regions of the Arctic" (J. Larsen et al. 2014: 47). In particular,

> Our original ambition had been to produce extensive sets of comparable data featuring ASI indicators for each of the six ASI domains. However, this task soon proved impossible given the current state of data quality and lack of data availability both at the panarctic level and at different geographical scales. It became clear that we had to limit our analysis to selected regions and, furthermore, that our set of indicators could not be compared between regions in any meaningful way given existing differences in data protocols in addition to other data issues. Furthermore, all five regional case studies required our teams to deviate to varying degrees from the technical definitions of individual ASI indicators. It was necessary to make adjustments to tailor the analysis to meet the regional availability of data and, hence, to settle for the best possible proxies or in some cases substitute with secondbest alternative indicators—though without compromising the validity of the analysis. (J. Larsen et al. 2014: 278)

Overall, the Russian case study, which focused on the region of Sakha (Yakutia), proved to the be the least-data-rich region. In this region, as in others, one could often pick the indicator that best told the story one wanted to tell about the region. For example, if you wanted to highlight a positive trend, you could emphasize that infant mortality rates were falling, but if you took a more pessimistic view, you could stress that suicide rates increased after the collapse of the

Soviet Union. Governments are also likely to try to manipulate indicators in an effort to convince domestic and international audiences that they are performing well (Cooley 2015: 5; Libman and Obydenkova 2016; Zaloznaya and Hagan 2012). Such findings point toward the need to collect several indicators for each domain to develop a complete and nuanced picture of the situation.

Another set of indicators came from Andrey Petrov's project on the Inuvialuit, a group of Indigenous people in the Arctic, as part of the Canadian project called Resources and Sustainable Development in the Arctic. This dataset includes information on population, education, culture, the labor force, well-being, income, government, and housing.

Roadmap for the Book

This book is divided into four parts. Part I introduces what we mean by urban sustainability and how to measure it. The Introduction describes ISO 37120 as the tool we will use to measure sustainability and chapter 1 lays out what we mean by Arctic cities. Part II includes chapters that test out various urban sustainability indicators in Arctic conditions to see how well they work. Part III discusses a variety of dimensions that are missing from the current international standard and suggests ways to provide a more comprehensive understanding of urban sustainability in Arctic conditions. Finally, the Conclusion pulls together the various strands of what we have learned and provides a comprehensive analysis of what an Arctic Urban Sustainability Index might look like, showing where ISO 37120 succeeds and where it falls short. The discussion below briefly lays out the arguments from each of the chapters.

Part I: Urban Sustainability in the Arctic

Chapter 1. "Arctic Cities," by Carrie Schaffner, George Washington University

This chapter explains how we define Arctic cities and lists the nearly fifty cities that meet our criteria. The chapter then explains how Arctic cities are different from other cities in the rest of the world. Most notably, their environment limits access, makes energy expensive, requires intensive attention to infrastructure, reduces the availability of labor, mandates reliance on vulnerable food supply chains, and

threatens the maintenance of a strong community culture. Key drivers for development in the Arctic are the development of indigenous societies, resource extraction, and protecting national security. Finally, the chapter explains that, despite the harsh conditions, people remain in the Arctic, among other reasons in order to develop their place-based capital and benefit from subsidies. This overview of Arctic cities provides the context in which we proceed to test out some of the ISO indicators in various case study cities.

Part II: Testing Indicators of Arctic Urban Sustainability

Chapter 2. "Shrinking Cities, Growing Cities: A Comparative Analysis of Vorkuta and Salekhard," by Nadezhda Zamyatina, Moscow State University; and Luis Suter, Nikolay Shiklomanov, and Dmitry Streletskiy, George Washington University

The authors apply several of the ISO indicators to two Russian cities: Vorkuta, a declining coal-producing city, and Salekhard, a booming natural gas regional capital. Vorkuta reached the peak of its productivity in the 1950s and 1960s and has been shrinking along with Russia's coal industry ever since. Salekhard is now developing as global demand for natural gas grows. This case study of two cities helps refine our understanding of how ISO 37120 works in Arctic conditions by focusing attention on the determinative indicators of transportation links to southern cities and diversification of the economy into export-oriented resource extraction, provision of administrative services, and locally oriented economic development. The chapter also stresses urban design and attachment to place. The authors argue that the ISO set of indicators would better apply to the Arctic by taking into account the remoteness and inaccessibility of Arctic cities, their frequent reliance on a single factory, the way the cities are laid out, and the emotional links people feel toward their cities due to the social capital they have developed over time.

Chapter 3. "Norilsk: Measuring Sustainability in Population Size and Well-Being," by Marlene Laruelle, George Washington University

As the largest city built on permafrost, one of the most polluted in the world, and a destination for a range of diverse emigrants, Norilsk puts a heavy burden on its social network. This chapter examines a wide range of ISO indicators in the context of Norilsk. It finds that

the index provides a useful overview of the state of the city. However, the indicators fall short because they do not measure the effort stakeholders make in trying to improve their sustainability performance, the emotional attachments based on a sense of place, the social fabric of the city and its residents, the remoteness of the city locations and transportation accessibility, and the cost of goods in the city in relation to local salaries. Additionally, the ISO measures do not provide an overall sense of the dynamics in the city.

Chapter 4. "Yakutsk: Culture for Sustainability," by Vera Kuklina with Natalia Shishigina, V. B. Sochava Institute of Geography of Siberian Branch of Russian Academy of Sciences

This chapter applies the culture components of ISO 37120 to Yakutsk. The chapter develops four indicators for culture: cultural institutions, cultural diversity, cultural economy, and contact with nature. The analysis shows how each of these elements functions in the city context. Counting cultural institutions is an easy way to compare cities, but the numbers hide much of the richness of cultural life in Yakutsk. The cultural diversity section addresses the questions of ethnic and rural identities, linguistic and religious landscapes, and institutions in the urban context. Cultural economy includes economic activities that use culture as a resource. Finally, contact with nature examines how Indigenous peoples bring their practices into the city. Ultimately, the chapter shows that the quantitative indicators can be useful in providing an introduction to the city and in launching a discussion of culture, but that qualitative studies must complement the indicators to provide a more comprehensive understanding of how culture can contribute to sustainability.

Chapter 5. "Assessing Energy Security in Nome and Lavrentiya: How Breaking Down Energy and Governance Silos Makes a Difference," by Katherine Weingartner, George Washington University; and Evgenii Antonov and Alexey Maslakov, Moscow State University

This chapter examines how two small, geographically similar cities near the Bering Sea, one in the United States and one in Russia, ensure their energy security by investigating the ISO 37120 parameters for energy and governance. The primary focus is on how the different governance structures of the two cities impact energy resilience. Both city structures are remote from higher-standing regional and federal governments, but Nome has more autonomy than Lavrentiya in

devising local solutions. The chapter concludes ISO 37120 would be more effective in addressing energy governance issues if it included a way to measure the availability of financing for renewable energy projects at the municipal level.

Part III. Extending the International Standard for Measuring Urban Sustainability

Chapter 6. "Fate Control and Sustainability in Arctic Cities: Recasting Fate Control Indicators for Arctic Urban Communities," by Andrey N. Petrov, University of Northern Iowa

This chapter examines in detail the concept of fate control, defined here as the ability to guide one's own destiny by making choices and transforming those choices into actions and outcomes. The chapter develops a method to measure each city's capacity to make choices and the resources it has to implement them. The chapter contributes to the theoretical dimension of the discussion by extending the international standard for measuring urban sustainability by adding a measure of the ability of communities and individuals to govern themselves. Petrov applies the Fate Control Index to twelve Arctic cities, demonstrating what this tool can tell us and illuminating the road forward for future applications.

Chapter 7. "What Do ISO Indicators Tell Us About Corporate Social Responsibility and Sustainability in Cities of the Yamal-Nenets Autonomous Okrug, Russia?," by Stephanie Hitztaler and Veli-Pekka Tynkkynen, University of Helsinki

This chapter uses several ISO 37120 indicators to measure the contribution of corporate social responsibility to the cities of the natural-gas-producing Yamal-Nenets Autonomous Okrug. Some of the indicators show the benefits of such programs, especially in the area of building new sports facilities. But despite this improvement in the sustainability ranking as measured by this indicator, the ongoing fossil fuel extraction and Gazprom's overall impact on the area reduce the city's sustainability. In this sense, ISO indicators can be cherry picked in ways that are deceptive in terms of a corporation's overall impact on urban sustainability.

Chapter 8. "Planning for Sustainability: The Russian Case," by Alexander Sergunin, Saint Petersburg State University

Sergunin's chapter points out that ISO 37120 does not pay sufficient attention to the planning process. He provides an overview of how the urban planning process works in the comparative context of several Russia Arctic cities—Arkhangelsk, Murmansk, Monchegorsk, Nickel, Norilsk, Salekhard, Severodvinsk, and Vorkuta. He examines how these cities implement the concept of sustainable development; which governmental and societal institutions are involved and the degree to which they are open to public input; which aspects—economic, environmental, or social—are prioritized; and whether the policies are short-term efforts or are conducive to the sustainable socioeconomic and environmental development of the northern urban areas that actually improves the human condition. The analysis finds that the planning offices are typically understaffed and lack the resources for the comprehensive work to which they aspire, not all the plans emphasize the role of civil society input, the level of concern about environmental issues varies with the level of pollution in the cities, and despite some clear successes, there is a long way to go toward increasing transparency and involving public participation in the overall process.

Chapter 9. "Transport Connectivity and Adapting to Climate Change in the Russian Arctic: The Case of Sakha Republic (Yakutia)," by Aleksandra Durova, Massachusetts Institute of Technology

ISO 37120 does not pay much attention to connectivity between cities, a key problem in the Arctic. Durova's chapter addresses this issue in detail. Existing transport connectivity gaps in combination with climate change impacts make communities vulnerable to connectivity disruption risks. The livelihoods of communities in this context are largely affected by government policies in the Arctic and adaptation actions in the transport sector across various scales. This chapter examines the nature of adaptation actions in the transport sector of the Sakha Republic (Yakutia). Findings of the study demonstrate that adaptation planning remains in its infancy. When adopted, adaptation measures are shaped by a combination of stressors, including safety and emergency risks, as well as efforts to make money from climate change rather than simply addressing its deleterious impacts. Adaptation actions responding to urgent needs may reduce sensitivity

and exposure to climate change risks, but do not address the root causes of vulnerabilities. Adaptations driven by potential opportunities can increase resilience of the transport system, but also both run the risk of becoming dysfunctional and increase the potential of negative implications in the long term.

Chapter 10. "Sustaining Sustainability in Whitehorse, Yukon, Canada," by James Powell, University of Alaska Southeast

Sustainability planning has little value unless the strategies prepared are actually implemented. ISO 37120 pays little attention to this issue. Whitehorse is a leader in implementation, drawing on funds from Canada's national gas tax. Key to successful plan implementation is identifying priority indicators and issuing regular reports to determine to what degree they were actually implemented. The Whitehorse program's key components include a strategic sustainability plan initiated by citizens and the city government and institutionalized with a joint Planning and Sustainability Services Office, a comprehensive list of sustainability indicators that reach across all programs, and a website for sustainability with dashboards for each indicator. Whitehorse's ability to meet many of its benchmarks makes it a good model for other Arctic cities.

Conclusion. "Next Steps for Arctic Urban Sustainability," by Robert W. Orttung, George Washington University

The conclusion ties together the major findings of the case study analyses and links them back to the theoretical introductory chapter. It then lays out the directions for future research. A key shortcoming of ISO 37120 is that it lacks a theory of sustainability that defines the drivers of sustainability. Other shortcomings include a lack of forward-looking dynamics and a failure to explain how the various components of sustainability work together. The standard does not always make sense in Arctic contexts because it does not take into account permafrost, the isolation of many northern cities, the lack of economic diversity, and the importance of Indigenous cultures. Future research will develop a comprehensive dataset that brings together measures for the 128 indicators across the nearly fifty cities with populations over twelve thousand people.

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CHAPTER 1

Arctic Cities

Carrie Schaffner

Introduction

When people think of the Arctic they are more likely to envision icebergs and polar bears than cities, and yet 8.5 million people live in urban areas in the circumpolar region. This chapter will provide an overview and definition of Arctic cities; consider the impacts of the unique environmental challenges affecting Arctic cities; identify what drives urban development in the Arctic; and finally, discuss why individuals choose to live in Arctic cities beyond employment alone.[1]

An Overview of Arctic Cities

There are numerous definitions of the term "Arctic" based on a combination of geographical and climatic factors. The Arctic can be demarcated by the Arctic Circle, the northernmost tree line, the permafrost line, the July isotherm, or sea ice extent. Most of these definitions incorporate an Arctic that extends well south of the actual Arctic Circle. The US Arctic Research and Policy Act of 1984, and revised in 1990, uses a strict definition following the Arctic Circle, except in Alaska where significantly more territory is added (Gaylord 2009). Previous research, such as the *Arctic Human Development Report* (Larsen and Fondahl 2015), considers these variations and adopts a wider region to be Arctic. However other prominent organizations, including the Arctic Council Emergency Prevention, Preparedness,

and Response working group, the Arctic Monitoring and Assessment Programme, and the Conservation of Arctic Flora and Fauna draw the border differently as well. This project defines the Arctic region as the largest possible area encompassed by this agglomeration of Arctic research organization borders.

Defining the terms "city" or "urban" may be even more troublesome than defining "Arctic." There is no common global definition of urban settlement, and definitions vary significantly across countries and over time. Criteria might include administrative qualities, a minimum population threshold, the presence of infrastructure such as roads and power grids, the provision of services such as education and health care, and the percentage of the population employed in nonagricultural sectors. Population size and density are the most common criteria, but administrative criteria are included as a component in most national definitions of urban. Functional infrastructure and economic criteria are less common, and while urban agglomeration may be an ideal measure, it is difficult to use because of the variation in how well it is reported (United Nations Department of Economic and Social Affairs 2014).[2]

Places like New York, Singapore, London, and Dubai skew the idea of cities toward megametropolises or megacities, but settlements that are too far from these megacities to benefit from their concentration of resources and services must develop to provide those functions. It is therefore important to think of cities more fundamentally in terms of the functions they serve. Any densely populated area that serves diverse social, cultural, economic, and political activities can be considered a city. In remote regions, such as the Arctic, urban areas with smaller populations are more likely to serve many of these functions because no other city exists in proximity. Recognizing that because Arctic cities serve similar functions to larger cities in less-remote areas, our Arctic project, which is part of the National Science Foundation's Partnerships for International Research and Education (PIRE), includes any city with a population greater than twelve thousand people.

Setting quantitative parameters for Arctic cities is necessary to identify cities that should be considered, but it does have some drawbacks. There are many arguably urban places in the Arctic with populations of less than twelve thousand that have been excluded. However, we did make a few exceptions. We included Anadyr (population 8,288) because it is usually considered an important Arctic city. For similar reasons, we included Yakutsk, Magadan, and Oulu that were outside the Arctic boundaries that we otherwise used.

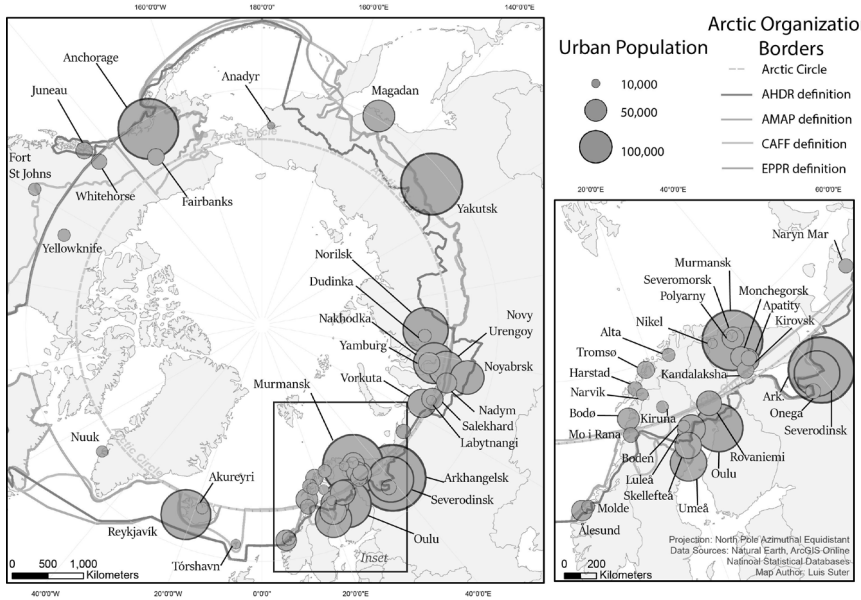
Table 1.1 | *Population statistics for Arctic cities*

Country	Total no. cities	Percentage of Arctic cities per country	Total population (Arctic cities)	Percentage of total Arctic urban population
Canada	3	6.00%	67,949	1.75%
Greenland (Denmark)	2	4.00%	29,749	0.77%
Finland	2	6.00%	262,871	6.76%
Iceland	2	4.00%	230,727	5.94%
Norway	8	16.00%	243,902	6.28%
Russia	25	50.00%	2,364,549	60.84%
Sweden	5	10.00%	323,119	8.31%
United States	3	6.00%	363,411	9.35%
Total	*50*		*3,886,277*	

There are fifty cities that meet these criteria (see table 1.1 for an overview). According to the *Arctic Human Development Report* (Larsen and Fondahl 2015), nearly two-thirds of the Arctic population live in cities. The population of Russian Arctic cities accounts for 60 percent of the Arctic urban population according to our definitions. The rest of the urban population is distributed in smaller cities throughout Northern Europe and North America. Of the twelve Arctic cities with populations greater than a hundred thousand people, Russia has eight while Finland, Iceland, Sweden, and the United States have one each. With twenty-five qualifying cities, Russia has far more cities than any other Arctic nation and these cities are generally larger than their counterparts elsewhere. There are many other differences, both striking and subtle, in the nature of Arctic cities that will be discussed in greater detail in the chapters that follow. Map 1.1 provides a visual overview of the cities included in this project.

The Impact of the Arctic Environment on Urban Development

Arctic cities contend with environmental challenges including remoteness, climatic extremes, permafrost, and polar night. Climate change exacerbates these environmental challenges. The Arctic is warming faster than any other region in the world (Adger et al. 2011; Borgerson 2013; Hassol 2004) and these changes promise to cause seasonal unpredictability, decrease snow and ice cover, destabilize permafrost, and increase the frequency and severity of storms (Descamps et al.



Map 1.1 | *Arctic cities that meet the spatial and demographic criteria of this research project. Map created by the author.*

2017; Hassol 2004; Morello 2013; Streletskiy and Shiklomanov 2016). Changes in precipitation rates and annual flow rates impact aquatic food sources, cause ice jams and resultant flooding, and increase erosion.

Loss of snow and ice has profound impacts on the Arctic. The decline of sea ice means less shore protection and increased flooding of coastal villages. As coastal villages and other remote settlements suffer the most acute effects of climate change, residents are migrating to Arctic cities; this migration is expected to increase as climate change worsens. The decline of ice and snow also reduces albedo, which is the reflectance of incoming solar irradiation. The reduction in reflectance "causes greater heating of the land and sea and therefore an acceleration of high-latitude climate warming and its attendant ecological and societal consequences" (Adger et al. 2011: 12).

The Arctic environment and the compounding effects of climate change present numerous challenges for Arctic cities. These environmental conditions impact access, energy, infrastructure construction,

economic development, food security, and culture, increasing costs and complicating logistics for Arctic cities.

Access

The Arctic environment presents unique challenges for access to northern cities. Economic development in remote Arctic cities relies entirely on marine and terrestrial access, but for many Arctic cities access is seasonal because of the limitations of summer marine routes and winter roads. Conditions along these routes can affect the delivery of annual supplies, limit market access for those providing goods to cities (Goto 2017), inhibit commerce and tourism development, decrease access to education and employment opportunities outside the city, and limit residents' travel (Karlsson 2017). Though climate models vary, all predict a negative trend in ice extent and thickness in the Arctic, which is expected to lengthen the marine season and potentially open new navigation potential, particularly along the Northern Sea Route, but will also decrease terrestrial access because it undermines the reliability of winter roads (Stephenson 2016).

Winter roads, traversing ice or snow, are important modes of access for Arctic cities, allowing winter passage over bogs, rivers, and other terrain that is not passable in the summer. Some roads may be partially usable in the summer or shoulder seasons, but typically handle lower maximum weights than in the winter. This means that some heavy machinery or other materials may be able to travel only in winter; in summer fuel and cargo loads must be lighter (Stephenson 2016). Under new climate conditions, ice-roads and river crossings may not be economically feasible or physically possible (Anisimov and Kokorev 2016). As climate change shortens the seasonal viability of winter roads, communities could become isolated, not only limiting the delivery of fuel and goods, but also cutting off access to emergency services.

Arctic warming could open new maritime routes, increasing potential for delivery of fuel and goods to cities and offering new trade and commerce opportunities, but the shipping potential is likely exaggerated. Though warming, the Arctic climate remains unpredictable, and open water increases the amount of drifting ice in shipping channels, thus increasing the risk of collisions (Stroeve and Meier 2017), and increases fog in the region, making navigation difficult (IPCC 2007; Morello 2013; Stephenson 2016).

Weather variability is not conducive to contemporary just-in-time supply models. Shipping is more likely to be effective for shipping oil

and minerals that are not as time sensitive, but poor mapping of the Arctic Ocean floor, additional structural requirements for ships, high insurance costs, and the need for specialized navigators and crew will keep costs high. Currently, there is also inadequate infrastructure for robust marine traffic in the Arctic including icebreaker assistance, infrastructure for refueling and repairing ships, and search and rescue capabilities (Pamel and Wilkins 2011). Increased Arctic marine traffic also increases the environmental risk to wildlife and humans.

Open water could also mean increased access for tourist cruise ships, thus expanding the potential tourism sector in Arctic cities. However, tourism increases human impact on the Arctic environment, and climate change could threaten the very landscapes and traditional cultures that draw tourists in the first place (Garcia-Rosell et al. 2017; Notzke 1999; Qu, Villumsen, and Villumsen 2015).

Energy

Most Arctic cities obtain a significant portion of their electricity from fossil fuels, including oil, diesel, petrol, kerosene, coal, and natural gas, but the remoteness, terrain, and climate complicate the logistics of getting fuel to Arctic cities. The logistics of fuel delivery, including river and marine navigation, ice-roads, railroads, pipelines, and 1,000-kilometer (km) routes, significantly increase the time and cost for fuel delivery to remote polar cities, and also increase environmental risk. The delivery period for coal to the Russian Arctic can range from three to thirty months, with three to four transshipments. This extended transportation timeline implies enormous losses in both quality and quantity (Barakaeva, Batugina, and Gavrilov 2015). Delivery schemes must also allow for seasonal variability in the availability of transportation routes: delivery of fuel by tanker to Yakutsk and Anadyr, Russia, means vulnerability to changes in navigability of waterways due to climate change including drifting ice, ice jams, increased fog, and more-severe storms. In the United States, the Alaska railroad eases dependency on waterways for the transportation of fuel and cargo, but railroads are not feasible for all Arctic cities.

While oil and gas extraction for energy production dominates the Arctic landscape, Arctic cities struggle to provide reliable, affordable electricity for residents. Alaskan residential and commercial consumers pay an average of 80 percent more than the US national average cost of electricity, while industrial customers pay almost 150 percent (US Energy Information Administration 2019); those in the Northern Territories of Canada pay up to ten times the Canadian

national average for their electricity. Since 2003 Russia has been providing federal funds to offset the cost of fuel delivery for electricity generation to Arctic cities like Yakutsk and Anadyr, lowering the price for local populations (Barakaeva et al. 2015).

Energy demands are high in the Arctic, particularly in the winter when temperatures plunge and days are dark. Energy production in Arctic cities varies considerably by location and the resources available. Yellowknife, Canada, uses a combination of hydropower, diesel, natural gas, and, increasingly, renewable sources other than hydro (Northwest Territories Power Corporation n.d.). Salekhard, Russia, relies on gas-fired power plants, though a planned nuclear power plant could alter the energy portfolio. Local fuel production could strengthen energy security and decrease expenses for northern cities. While coal mining in the Arctic is an option, it creates broader concerns for Arctic sustainability. Renewable sources including solar, wind, hydropower, and tides might offer better fuel sources (see chapter 5 in this volume).

Reykjavik and Akureyri, Iceland, and Luleå, Sweden, are leaders among Arctic cities in sourcing 100 percent of their electricity from geothermal, hydropower, and other renewable resources. Increasing investment in renewable energy around the circumpolar region and the development of new renewable technologies creates opportunities for Arctic cities to lower their energy costs. In a recent assessment of renewable energy in Nunavut, Canada, World Wildlife Fund Canada found that investment in renewable energy in northern communities reduced operation and maintenance costs, making renewable energy more economically viable than fossil fuels alone (McDonald and Pearce 2013). Hydropower is an important energy source for many parts of Northern Canada and Scandinavia, and could benefit from climate change as increased runoff in winter yields greater power generation during the heating season (Anisimov and Kokorev 2016).

Infrastructure

Urban infrastructure is impacted by the Arctic environment in three ways. First, Arctic cities demand specialized architecture and engineering to accommodate the unique environmental conditions. Second, building costs are high because construction materials are more expensive in that region. Finally, the remoteness and climate pose unique challenges to developing and maintaining effective urban transportation networks.

The extreme Arctic climate creates significant challenges for building design and construction. Requirements include accounting for permafrost, high winds, extreme temperatures, and, in the case of offshore infrastructure, pack and drifting ice. Conventional architecture and infrastructure design are not always appropriate for the Arctic environment. Arctic cities were historically designed around service provision and often ignored traditional knowledge and values, climate, and geography. In many places, Arctic design focused on insulating against the environment, yet often neglected indigenous understanding of wind patterns and access to resources (Sheppard and White 2017). Continuity of planning in the long-term has been problematic in the North American Arctic where development has been episodic, driven by military, scientific, and economic activity (Jull 2016: 215). Conversely, planning for Russian Arctic cities was highly centralized under Soviet rule, and large cities were developed around extraction industries. Kiruna, Sweden, initially developed in an ad hoc fashion around an iron mine, but now as the city faces relocation due to destabilization as a result of mining, an eighty-five-year plan for the city exhibits conscious design for environment, functional land use, and the perpetuity of the city (Ghilardi + Hellsten Arkitekter 2014). Nearby Luleå, Sweden, is not starting over as Kiruna did, but instead has created a long-term vision for sustainable development (Luleå Kommun 2008).

The effect of climate change on permafrost presents a particularly unique challenge for Arctic cities. Warming undermines the bearing capacity of permafrost, weakening foundations and threatening the stability of buildings, pipelines, and transportation infrastructure (Grebenets, Streletskiy, and Shiklomanov 2012). Changes in permafrost have the most profound effects in areas of concentrated human activities. "As such, cities represent a nucleus of anthropogenic impacts on the fragile Arctic environment where climate-induced impacts on permafrost conditions are greatly amplified" (Streletskiy and Shiklomanov 2016: 205).

Appropriate design and construction require additional technical expertise and specialized materials and systems that are both more difficult to procure and costlier. Poor design in the Arctic has resulted in energy inefficient buildings that increase energy costs. There is a real need for Arctic design that would both represent the culture and identity of the Arctic and be appropriate to the environment and lifestyle (Berkowitz 2017; Jull 2016). Arctic-specific design could lower costs because materials could be used more efficiently, and could increase heating efficiency thereby decreasing energy demand.

Though the Arctic is rich in natural resources, nearly all building materials and consumer goods are transported over long distances via either ice-roads or ship, making construction materials expensive because of the amount of fuel required to cover the long distances, and the unique requirements of both shipping and winter-road trucking. As discussed above, ships that traverse the Arctic are more expensive to build because of structural requirements; in addition, because of ice conditions and shallow harbors, Arctic-bound ships are smaller and carry less cargo, thereby increasing shipping costs. Winter roads are vital supply links for many Arctic cities, but warming temperatures mean they are usable for fewer weeks each year. The decreased availability of roads due to warming temperatures further drives up costs as inland communities must then rely on air shipments of supplies (Stephenson 2016). Both overland and marine routes present unique challenges in terms of affordability and accessibility, and are highly sensitive to climate change.

Urban transportation networks are a key piece of urban sustainability, lowering per capita carbon footprint and increasing livability and accessibility, especially important given the remoteness of Arctic cities. However, urban transportation networks in the Arctic are undermined by environmental conditions. In building permanent transportation infrastructure, Arctic cities contend with the seasonal terrestrial access that precludes permanent transportation development and thawing permafrost that threatens roads, bridges, and railroads.

The comparatively low population density of most Arctic cities presents additional difficulties for urban transportation networks. High-density urban development is generally considered a prerequisite for effective transportation networks, with one oft-cited study showing that residential density should exceed 4,200 persons per square mile (Pushkarev and Zupan 1977). Cities like Anchorage, Alaska, struggle to create effective mass transit over long distances with much lower population density.

Economic Development

The Arctic environment impacts economic development not only by limiting access, energy production, and infrastructure, but also by affecting labor availability and increasing the environmental risks associated with pursuing the further development of extractive industries. Though all of the Arctic nations except Russia rank in the top twenty of the World Bank's ease of doing business index, the pace and scope of economic development in the Arctic in light of climate

change are likely to be moderate due to complex logistical challenges (Käpylä and Mikkola 2015).

The cost of labor is often higher in the Arctic due to shortages of qualified personnel, high costs of living, and the specialized nature of the work, all attributed to the remoteness and environmental hardships of the Arctic. The shortage of qualified labor is due to the relatively undesirable living conditions and the lack of suitable training programs and educational opportunities in the Arctic (Emelyanova 2017). Financial incentives are often required to recruit workers with the necessary skills. Additionally, high wages are required to compensate for the high cost of living. Many of the jobs in the Arctic related to natural resource extraction, scientific research, or the military demand higher wages because of the technical expertise required, and hazard pay because of the added risk of environmental and occupational threats.

Arctic warming is yielding access to massive oil and mineral deposits (Borgerson 2013) that present economic development opportunities for Arctic cities, but developing those resources remains both costly and logistically challenging. While the Arctic is thought to contain about 13 percent of the world's undiscovered oil, 30 percent of its undiscovered natural gas, and 20 percent of its undiscovered natural gas liquids, 84 percent of those resources are estimated to lie offshore (Pamel and Wilkins 2011: 344). Arctic oil and gas are the most expensive in the world to develop and carry considerable environmental risks, particularly offshore (Stephenson 2016: 184). Developing offshore oil and gas makes economic sense only if the global demand for fossil fuels is high.

Food Security

The Arctic environment is not well-suited for agriculture and food production. While Indigenous communities have long relied on subsistence activities, including fishing, foraging, hunting, and whaling for food sources in the North, such subsistence activities are limited in the city, and are unable to meet the needs of all of the city's residents. According to one Canadian study, Arctic Indigenous households experience high rates of food insecurity, with households with children more food insecure than those without (Huet et al. 2017; Ruiz-Castell et al. 2015). "The issue of greatest concern to North American Arctic Natives today is how (climate) changes affect food security—that is, the relationship between changing climatic conditions, country food quality and quantity, and the ability of community members to access

these resources as the physical geography shifts and changes literally beneath their feet" (Dinero 2013: 119).

The Arctic environment limits food production, but traditional local food sources continue to be a critical part of people's diets, including fish, seal, whales, and caribou, along with native plants and berries. Domesticated reindeer have also been an important part of the subsistence pattern of Eurasian Arctic peoples over the past two thousand years (National Museum of Natural History 2004). Reindeer herding among the Saami in Sweden and other parts of Scandinavia and Northwestern Russian are increasingly difficult because of competition for pasture lands and irregular melt and thaw cycles due to climate change that create ice layers through which reindeer cannot access grass. Changing ice patterns have affected other animal behavior and therefore hunting practices, and the northward migration of nonnative species because of warming temperatures has introduced new parasites and bacteria that further threaten native plants and wildlife (Adger et al. 2011). While most of these subsistence activities do not take place in cities, they continue to play an important role in cultural expression, social cohesion, and a varied diet for the Indigenous peoples who live in Arctic cities. For the 50 percent of Native Alaskans who live in Anchorage, many still identify with their ancestral villages and return regularly throughout the year to participate in whaling, hunting, and foraging (Biddison 2017).

Agriculture is limited by extreme temperature and light/dark cycles. Iceland is an anomaly in the Arctic with an unlimited geothermal resource that makes it possible to grow food in greenhouses year-round. For cities in other Arctic countries, food is imported, often with an exorbitant price tag. In Alaska, 95 percent of food is imported (Caster 2011), primarily from the "Lower 48," a term Alaskans use to refer to the conterminous United States. There is increasing interest in indoor farming using hydroponics, artificial light, and vertical growing systems as a means of meeting urban demand in the Arctic. Technological improvements for indoor growing increase the potential for these methods to produce food in hostile environments (Seefeldt and Helfferich 2013; Suter 2017), and indoor farming is already taking place in Anchorage, while plans are underway to build vertical greenhouses in Sweden (Caldwell 2016).

Culture

Climate change presents unique challenges to the sustainability of Arctic cultures, and has both economic and cultural impacts through

the loss of nature, and a corresponding inability to continue traditional cultural practices. Cultural continuity is a key to wellness and well-being for Indigenous peoples. In diverse urban environments where there is pressure to assimilate, cultural continuity is even more important (Ogilvie 2017). Climate change poses risk to valuable and unique places, and could undermine the emotional, symbolic, spiritual, and intrinsic values of the environment (Adger et al. 2011).

Traditional ecological knowledge has allowed communities to adapt to changing conditions, but rapid, profound changes in the environment may push beyond the limits of this adaptability. The lack of predictability and the increasing use of technology have interfered with the passing of traditional knowledge to youth (Adger et al. 2011), so younger generations may not have the same adaptive capacity. Climate change is altering patterns of resource use and disrupting community institutions and ecological knowledge, and will change the cultures and environments of the Arctic irreparably.

Arctic Urban Challenges in the Global Context

Remoteness and other environmental challenges are not unique to Arctic cities, and it is important to situate urban Arctic issues in the global context. Cities like Darwin, Australia, and Jakarta, Indonesia, certainly do not contend with the extreme cold, snow, and ice that characterize Arctic cities, but they do share some similar challenges related to location and vulnerability to climate change.

The city of Darwin, Australia, contends with extreme temperatures at the opposite end of the spectrum from Arctic cities, but as a remote city in the otherwise sparsely populated Northern Territory, it relies heavily on long-distance shipments of goods and materials, and bears a similar burden to Arctic cities in terms of cost. Like the Arctic, Darwin is also vulnerable to climate change and is experiencing more storms, increased flooding, and rising temperatures. The hotter temperatures also heighten the demand for electricity production due to increased desire for air conditioning (Beer et al. 2013).

Jakarta, Indonesia, is another coastal city that is vulnerable to a high incidence of tropical storms and contends with frequent flooding. Coupled with poor infrastructure, flooding in Jakarta has caused not only loss of life, but also shortages of housing and basic services; flooding has also increased disease incidence because of the presence of contaminated water. Like Arctic cities, Jakarta is highly sensitive to the increased frequency and severity of storms due to climate

change. Jakarta is likely to suffer increasing incidence of tropical storms, while the Arctic experiences more-frequent and more-severe storms because of increased open water (Morello 2013).

Drivers for Urban Development in the Arctic

In spite of all of the environmental challenges of building and maintaining cities in the Arctic, there are many reasons for cities to exist there. Indigenous settlements expanded from scattered subsistence-based groupings to dense urban areas because of a combination of economic incentives, modernization efforts, integration policies, and centralization of government services. Opportunities for natural resource extraction and concerns for protecting national security also played pivotal roles in Arctic urban development.

Expanding Indigenous Economies and Increased Centralization

The earliest evidence of humans in the Arctic dates to forty thousand years ago in Western Siberia. In North America, Alaska has been inhabited for at least fifteen thousand years, and researchers believe that Greenland and Canada were settled four thousand years ago. Numerous cultural groups live in the Arctic circumpolar region including Inuit, Inupiat, and Yupik in Alaska, Canada, and Greenland; Saami in Scandinavia and Western Russia; Nenets in Northwest Russia; Sakha (Yakut) in Eastern Siberia; and Chukchi of Far East Russia (National Museum of Natural History 2004). Iceland is the only Arctic nation without an Indigenous population. Early Indigenous groups used subsistence practices including hunting, fishing, whaling, and foraging; today subsistence practices continue to be an important part of Indigenous culture and livelihoods in the Arctic. Historically, Arctic settlements were low density with minimal environmental impact (Streletskiy and Shiklomanov 2016).

Many Arctic cities, including Tromsø, Norway; Rovaniemi, Finland; and Yellowknife, Canada, developed first as Indigenous hunting and trading centers. Centralization of government services and migration to these cities increased urbanization. Following the conquest of Siberia in the sixteenth and seventeenth centuries, Russia established frontier outposts based largely on fur trapping to defend its new territory (Reisser 2016). In Canada in the 1920s, after famine and epidemics had decimated the population of animals on which the fur trade had been built, the government intervened, leading to a more-centralized,

less-nomadic lifestyle (Duhaime et al. 2004). In Nuuk and in Northern Canada, when subsidies dried up for consumer goods and services in small settlements, increasing the hardships for those living in smaller towns, populations became more concentrated in large urban centers in the Arctic. Across the Arctic federal governments forcibly consolidated populations in order to provide compulsory schooling for native children (Einarsson et al. 2004; Heleniak 2014).

As trade expanded and cities improved with the development of infrastructure, urban populations grew with increased rural to urban migration and the arrival of immigrants. In 1880 99 percent of the Alaskan population had been Native Alaskan, but after the discovery of gold around the turn of the century, that number dropped to just 26 percent by 1950. Northern Canada experienced a similar rush due to gold, though few miners stayed, so that by 1931 Indigenous peoples accounted for 86 percent of the population (Heleniak 2014). The expansion of mining in recent decades has led to population growth due to migration and high fertility rates among migrants. In Iceland new industrial opportunities prompted migration to Reykjavik by both rural Icelanders and foreign immigrants.

Extractive Industries to Satisfy Growing Southern Economies

The extraction of natural resources played a significant role in the founding of many Arctic cities and can be credited for the site selection of those cities. Rovaniemi, Finland, expanded quickly from a Saami trading center to a larger settlement because of both timber logging and gold. Kiruna, Sweden, is the site of a large seam of iron ore around which a city sprang up. The cities of Yellowknife, Canada, and Fairbanks, Alaska, boomed after the discovery of gold, while Anchorage also benefitted economically from the discovery of oil. In Russia the city of Norilsk owes its location and growth to nickel mining. Populations grew as people moved to Arctic cities for jobs in extractive industries.

While natural resource extraction has long been practiced in the Arctic, it was the growth of southern economies and the insatiable demand for oil, gas, and minerals such as iron and nickel that drove development of Arctic extractive industries. Demand for oil and gas spurred development in four Arctic nations: Canada, Norway, Russia, and the United States. Since the 1960s sixty-one large oil and gas deposits have been found in these four countries; more deposits will likely be found (Stephenson 2016). These deposits could be increasingly accessible because of the lengthening summer season,

dwindling sea ice, and new technology development. Greenland may hold the world's last great oil reserve (USGS 2008), as well as a bounty of rare earth metals. Though currently Greenland is not mining, the expansion of Home Rule in 2009 has allowed Greenland to pursue commercial relationships with other countries including China and South Korea. Foreign investment and mining could eventually displace the annual subsidy from Denmark, allowing Greenland to assert political independence (Borgerson 2013).

Oil and gas extraction currently dominate the resource landscape in the Arctic. The demand for Arctic resources has dropped off in recent years because of the availability of shale oil, but in countries such as Japan where there is no shale oil resource, the demand for Arctic oil remains high. Unable to meet demand with current reserves, Russia is seeking to open new sites for exploitation, but the offshore location of these deposits comes with higher costs, more-severe climate conditions, and high environmental risk (Filimonova 2013). Sanctions following the hostilities in Ukraine have also slowed these efforts.

"Apart from oil and gas, the Arctic abounds in other mineral resources, including diamonds, gold, silver, tin, iron ore, zinc, uranium, and nickel. In addition, Canada has now become the world's third-largest producer of diamonds, with mines operating in Nunavut and the Northwest Territories" (Ruel 2011: 827). The LKAB mine in Kiruna, Sweden, contains 90 percent of the iron ore in Europe. As one of the largest underground mines, LKAB has developed much of its own mining technology and equipment and has marketed this expertise to other mining operations overseas. Fifty percent of the jobs in Kiruna are directly related to the mine, and starting wages are high—Kiruna is the second-wealthiest community in Sweden (LKAB representative, interview with the author, 15 June 2017).

The exploitation and extraction of natural resources not only spurred infrastructure development and encouraged migration, but also drove investment in transportation, including railroads and roads. Extractive industries continue to play a significant role in the Arctic economy. But even as rising temperatures attributed to climate change open new reserves and new opportunities for extraction, they also bring increased global attention to the practice of oil and gas extraction. Mining oil and gas in the Arctic brings with it additional environmental risk because of the fragile environment. Remote sites mean delayed response time in case of spills or other accidents; extreme cold and other unique factors can reduce the efficacy of clean-up technologies; and fragile and slow growing flora and fauna can mean delayed recovery.

Protecting National Security

Arctic urban development has also long been a national security strategy in the Arctic nations. In Russia the discovery of oil and gas reserves, coupled with the post–World War II fear of invasion, prompted intensified industrial development in the Arctic (Streletskiy and Shiklomanov 2016). The Soviet strategy for Arctic development was state-centric, with near total reliance on resource extraction and military modernization, a strategy that has seen revitalization in recent years under Vladimir Putin. Russia's relentless pursuit of military and industrial progress in the Arctic is a critical piece of the country's national identity (Conley and Rohloff 2015), and an important driver of urban development in Siberia. Under Soviet rule, populating Arctic settlements was considered an investment in national security, and Kremlin interest in settling the Arctic led to increased migration to the region. During the Stalin era, efforts to populate cities in the Far North also included sending prisoners to Arctic cities as forced labor in extractive industries in places like Salekhard and Norilsk (Reisser 2016).

Many other Arctic nations shared the USSR's concerns for sovereignty and security in the North. After the United States purchased Alaska from Russia in 1867, Washington established military outposts throughout the new state as an assertion of national sovereignty. Large military bases such as Fort Wainwright and Eielson Air Force Base in Fairbanks continue to play an important role in urban economies in Alaska by increasing the population and the consumer base for overall economic development, and encouraging ongoing infrastructure improvement. Though Nuuk, Greenland, was initially settled by Saqqaq and then Inuit Indigenous peoples, the city has served as an important administrative center for the Danish colonial government, though in recent years increased power has been transferred to the local Greenlandic government (Act on Greenland Self-Government 2009; Greenland Home Rule Act 1978).

Militarization is an important driver of economic development in the Arctic: Not only does it increase the population and the potential consumer base, but it also increases infrastructure investment. In Iceland airports at both Keflavík (serving Reykjavík) and Akureyri were built by the militaries of other nations (the United States and Great Britain, respectively). The Alaska–Canada Highway, or Al-Can, was built as an important corridor between Alaska and the Lower 48 during World War II; in Russia, the military built the first year-round airports in Siberia. These improvements to infrastructure increased

access to the Arctic, thus enabling economic development, and continue to play an important role in the viability of Arctic cities. Military installations in the Arctic also serve important emergency and search and rescue functions, a need that increases parallel to increases in commercial, industrial, and scientific activity in the warming Arctic.

New and expanded human and commercial activity in the Arctic has also increased the need for military and security forces to monitor activity. Both the recent US and Canadian national strategies (Government of Canada 2009; USG 2013) for the Arctic prioritize national security interests; in Russia, recently deployed forces in the Arctic include troops from a variety of branches.

Why People Choose to Live in the Arctic

Most non-Indigenous people arrived in Arctic cities seeking employment opportunities, but for both Indigenous and non-Indigenous people the high cost of living, environmental extremes, remoteness, and the threat of climate change to traditional lifestyles adds hardship to life. Though employment and economic opportunity continue to be an important motive for living in many Arctic cities, people also live there for other social and economic reasons. Place attachment is one powerful incentive for people to stay in cities regardless of whether employment opportunities are abundant. For Indigenous Arctic peoples, the Arctic is part of their cultural history and allows the expression of identity, culture, and history through traditional practices. Though the cost of living in Arctic cities is high, subsidies offset the high costs and add economic incentive for people to move to or stay in Arctic cities.

Place-Based Social Capital

Despite variations in the economic and educational conditions of Arctic towns and cities, more people have chosen to stay in the region than observers anticipated, which suggests that there are social factors at play beyond conventional measures of human development (mortality, rates of poverty and unemployment, per capita GDP) (Duhaime et al. 2004). In addition to economic incentives, many people choose to live in Arctic cities because of important social factors including cultural heritage and place-based social capital. Social capital is the ability to secure benefits through membership in networks and other

social structures (Portes 1998). Social capital is productive, like other forms of capital, and produces positive outcomes for individuals and societies (Adam and Rončević 2003), including economic growth, improved health and household welfare, stability, safety, and sustainability (Ganapati 2009).

With the exception of Iceland, every Arctic nation has a rich Indigenous cultural heritage that continues to play an important role in urban sustainability and development. For the nearly 50 percent of the Native Alaskan population that lives in the city of Anchorage, and the 30 to 35 percent of Indigenous peoples in Russia who live in urban areas (Streletskiy and Shiklomanov 2016; Shadrin 2017), social capital is place-based, tied to the Arctic, and extends beyond economic reasons to include ancestral histories, traditional subsistence livelihoods, and culturally significant geographies. In one study of Alaskan youth, researchers found that though youth would often leave to pursue higher education, many returned without completing their degrees because of the pull of place-based social capital, attributed in part to the remoteness of their hometowns (Lowe 2015). This place-based social capital could be combined with local educational opportunities and economic development in line with cultural affinities and values.

The remoteness and the geographical bounds of Arctic cities encourage patterns of intensive community interaction. "Our sense of identity is based on our interactions with the people that surround us through shared beliefs, traditions and language. Belonging is about belonging to a particular group of individuals. We define ourselves to a large extent by the communities we belong to. In small, homogenous societies in very remote locations, the parameters of belonging are so well defined that to be an outsider in some way may even be dangerous" (Leonard 2014: 139–140).

Place-based social capital plays an important role in individuals' ability to adapt to climate change and other environmental changes (Vorkinn and Riese 2001). The adaptive capacity and social safety-net present strong disincentives for people to leave their hometowns. Social capital in the form of social networks and cohesion, along with human and physical capital, can shape responses and the ability to adapt to environmental changes (Hamilton, Brown, and Rasmussen 2003). Canadian Inuit rank social factors like cultural identity as much more important than economic considerations (Edouard and Duhaime 2012), shedding light on why people might stay in a city in spite of an economic downturn.

Subsidies

While resource extraction remains indisputably the most significant economic incentive for continued urban Arctic development and population growth, subsidies also provide economic incentives. Subsidies in the Arctic range from formal federal funding provided to municipalities to financial assistance provided to individuals. These individual subsidies, which include the US Postal Service Alaska Bypass to keep shipping affordable, and housing allowances provided to residents of Akureyri, Iceland, are designed to alleviate some of the financial hardship of the high cost of living in remote Arctic cities.

In order to support urbanization and compensate for population decline after the end of forced labor, the USSR encouraged Arctic settlement through extensive northern subsidies. Incentives were provided to individuals to encourage them to move to and remain in the North, and to municipalities through large subsidies for transportation and basic economic resources. These subsidies for settlements included not only consumer goods but also industrial inputs such as coal for energy production and manufacturing (Reisser 2016). The Northern Benefits program included high wages, paid vacation, and leave time—all of which were unusual in other parts of the country (Reisser 2016). Government programs and incentives played an important role in the growing urban population of the Far North through the 1980s. The breakup of the Soviet Union and the end of subsidies provides a useful illustration of how this state policy affected population size. When subsidies for transport, wages, and consumer goods dried up, people fled smaller settlements, concentrating the population in large urban centers (Heleniak 2014).

Unofficial subsidies come in the form of investments made in infrastructure for commercial or military purposes but provide secondary benefits for residents. In parts of Alaska that were sparsely populated, the lack of infrastructure disincentivized migration and development, but as miners moved to more-remote areas in search of gold, company workers and later government personnel pushed for improvements to infrastructure such as roads, telegraph lines, railroads, and mail service that ultimately made parts of the state more enticing to migrants. The construction of the Trans-Siberian railroad in pre-Soviet Russia was the single most important factor in increasing settlement in the Russian Arctic, and the railroad both ensured reliable transportation and enabled large-scale trade (Stephenson 2016).

While official subsidies such as housing or energy allowances and investments in infrastructure are meant to ease hardship, they may

also entice others to migrate to or encourage people to stay in places that may not be best suited for large populations. Offering incentives is a strategy that began as a way to settle the Arctic as an expression of sovereignty in Russia and the United States and has continued to ensure an adequate industrial labor force. From a sustainability perspective, it is questionable whether increased population density should be encouraged in the Arctic, given the long shipping distances, higher energy costs, and increased environmental impact.

Conclusion

As home to 8.5 million people, a wealth of natural resources to feed global markets, and a bellwether of climate change, Arctic cities demand greater attention. As these cities contend with ever-more-challenging climate conditions due to climate change, it is important to understand the nature and character of these cities, why they developed, and why people stay in them. Understanding Arctic cities will inform a more constructive dialogue about sustainability in the Arctic.

The extreme climate in the Arctic affects people living in the region by limiting accessibility to other parts of the world and other parts of the North. It dramatically increases energy needs. The cold and ice pose severe infrastructure challenges. And human societies living in this context face difficulties in maintaining overall economic development and food security.

Nevertheless, there are strong drivers for urbanization. These began with the expanding Indigenous economies and the need for increased centralization of administrative functions among both the Indigenous and settler communities. Other drivers include the resource extraction required to feed the economies of the south and the need for national governments to ensure the security of their borders and homelands.

People choose to live in Arctic conditions primarily because there are lucrative jobs available there. Subsidies to work and live there also make the Arctic attractive. However, once people are there, they often develop strong place-based capital that they are unwilling to leave.

Applying the ISO 37120 set of sustainability indicators, described in the book's Introduction, to the Arctic cities helps us to understand how climate change will affect the planet's cities in some of the most extreme circumstances and a place where the climate is changing

most quickly. This effort will also provide insight into how useful the overall set of urban sustainability indicators are in practice. Part II of the book follows, and starts the process of testing out some of these indicators in a variety of case study cities.

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Notes

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2. Urban agglomeration is defined as the number of people living within the contiguous land area that is inhabited at a population density sufficient to qualify as urban.

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Part II

Testing Indicators of Arctic Urban Sustainability

CHAPTER 2

Shrinking Cities, Growing Cities

A Comparative Analysis of Vorkuta and Salekhard

Nadezhda Zamyatina, Luis Suter, Dmitry Streletskiy, and Nikolay Shiklomanov

Introduction

This chapter showcases the main differences in the development of Vorkuta and Salekhard.[1] The main section of the analysis examines in detail four aspects of sustainability—transportation, economic diversity, urban design, and attachment to place. The conclusion draws out the implications for measuring Arctic urban sustainability. Along the way, we examine how well the ISO 37120 (see the book's Introduction) stands up as a useful guide for measuring the extent of sustainability in these Russian Arctic cities.

Transportation, economic diversity, urban design, and attachment to place are particularly useful in tracing the divergent paths of Vorkuta and Salekhard. In this context sustainability is a function of how the cities are connected to the rest of the world, how well they develop different aspects of their economy, the role design plays in their growth and shrinkage, and the emotional connections that residents feel toward their city.

This chapter examines the Russian Arctic cities of Vorkuta and Salekhard as case studies in the outlook for sustainability. Both cities are useful for our larger analysis because they are analogous to many other cities of the Russian North and broader Arctic region. As an industrial center that simultaneously serves as a central city for a vast territory, Vorkuta is typologically similar to Mirny (Sakha-Yakutia

Republic) and Norilsk (Krasnoyarsk Kray). Salekhard also has similarities to many smaller administrative centers in the Russian Arctic, such as Naryan-Mar (Nenets Autonomous Okrug), Khanty-Mansiysk (Khanty-Mansi Autonomous Okrug—Ugra), Dudinka (Taymyrsky Rayon of Krasnoyarsk Kray), Anadyr (Chukotsky Autonomous Okrug) and to international counterparts, such as Whitehorse (Yukon), Iqaluit (Nunavut), and Nuuk (Greenland). See chapter 3 for a case study analysis of Norilsk and chapter 10 for a case study analysis of Whitehorse.

Methodology

This chapter is based on 2017 fieldwork conducted in both cities. The fieldwork included nine expert interviews (five in Vorkuta and four in Salekhard),[2] work with documents in local museums and excursions studying the cultural landscape of both cities. In Salekhard we made three excursions to different parts of the city with guidance from the local museum's staff.

The methodological background of the chapter draws on three groups of works:

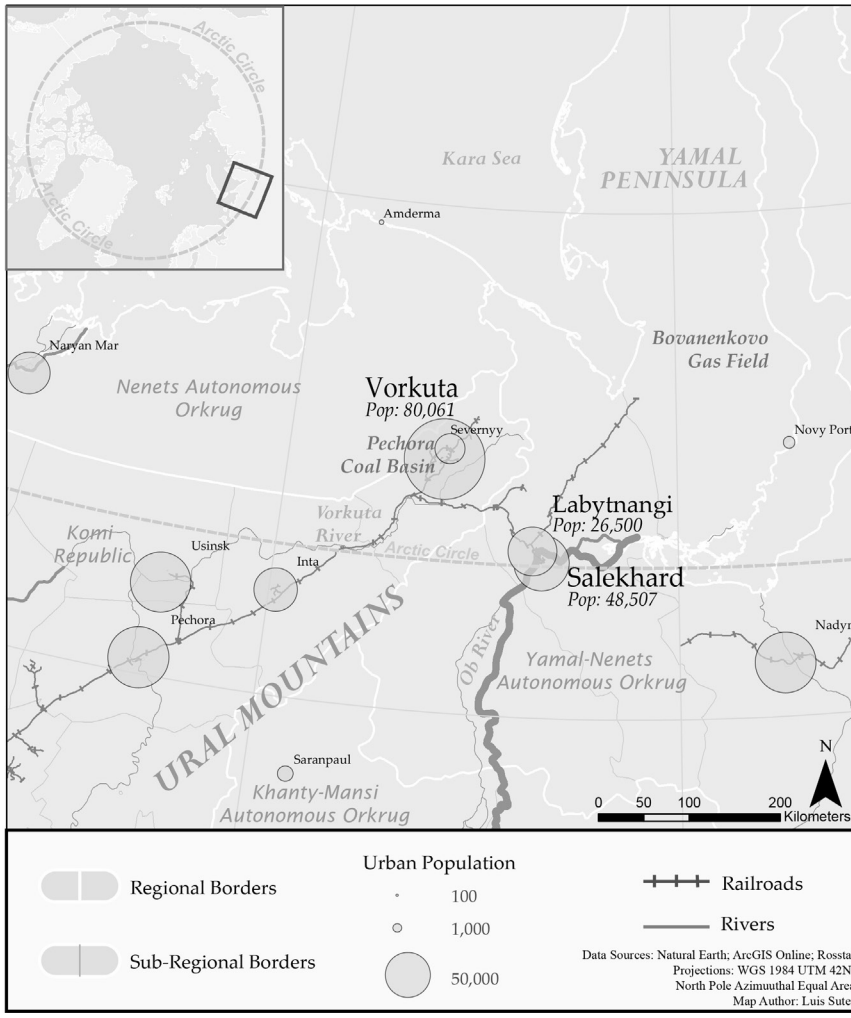
1. Overarching studies of Arctic urban sustainability and its key components (Giddens 2008; Orttung 2016; Petrov et al. 2017; Urry 2015) and especially the sustainability or resilience of the Russian Arctic cities (Baburin et al. 2016; Badina 2017; Zamyatina and Goncharov 2018b).
2. Publications addressing the development of Arctic cities, especially those that develop the concepts of remoteness and modern frontier studies (Ardener 2007; Baburin and Zemsov 2015; Berman 2013; Berman and Howe 2012; Berman, Kofinas, and BurnSilver 2017; Hansen, Rasmussen, and Weber 2013; Heleniak 2009; Humphrey 2014; Huskey 2005, 2006, 2017; Huskey and Morehouse 1992; Huskey and Taylor 2016; Jull 2017; Larsen and Fondahl 2015; Pelyasov 2011; Taylor et al. 2016; Zamyatina and Goncharov 2018a, in press).
3. Previous Russian and Soviet works on the development of the Far North explaining the genesis both of the cities and their role in the national economy and ideology in different periods (Gromov, Burhanov, and Chudnovskii 1982; Kosmachev 1974; Slavin 1961; Vasiliev and Selin 2013: 226–32; Yanovskii 1969).

The majority of works addressing both the sustainable development and remoteness of Arctic cities use statistical tools, but do not deal with institutional and other local factors (with the exception of some papers by Huskey, Berman, and Jull). Applied economic theory (e.g., see Clark, Feldman, and Gertler 2000; Fujita, Krugman, and Venables 1999) pays a great deal of attention to local factors, including the local institutional system, networking, and local capacity to produce and absorb innovation and new knowledge (see also: Zamyatina and Pilyasov 2015). Similarly, large-scale and global factors (especially remoteness and economic cycles) are important to the survival of Arctic cities (Berman 2013; Hamelin 1979; Huskey 2005, 2006; Taylor et al. 2016); these factors also constitute an important feature in the development of Arctic cities.

Accordingly, this chapter is an attempt to bring together the local and global as well as the institutional and economic factors shaping the sustainable development of Arctic cities. The novelty of this work lies in the use of local-scale research, taking into account institutional and landscape factors of sustainability, which are not typically included with standard statistical approaches. The main contribution of this chapter is the identification of specific, grassroots mechanisms for ensuring the sustainable development of the urban system, rooted in the specifics of the interaction of individual elements of the urban system (the knowledge production infrastructure, management system, urban landscape, behavioral attitudes of residents, etc.) in the global framework of the transportation system and economic and political transitions of the Soviet system. These grassroots factors are compared with statistics that are commonly used to both measure sustainability and help clarify the genesis of the numbers in the statistical tables.

Vorkuta and Salekhard: Divergent Trajectories of Development

Vorkuta and Salekhard are located on opposite sides of the Ural Mountains, which divide Russia into European and Asian parts (map 2.1). Vorkuta is geographically in Europe, in the northeast corner of the Komi Republic; Salekhard lies in Asia within the Yamal-Nenets Autonomous Okrug, on the bank of the world's seventh longest river—the Ob. The straight distance between these cities is only 140 kilometers (km), but the railroad connecting them runs approximately 300 km. The city pair is unique in Arctic conditions because, within close proximity, they host significant urban populations in remote and



Map 2.1 | *Vorkuta and Salekhard, their railroad connections, and their 2016 urban population. Map created by the authors.*

environmentally challenging conditions. Both cities are also exceptional in terms of their urban landscape, since they are designed to withstand extreme conditions and are built on permafrost. While large urban centers are characteristic of the Russian Arctic, they are less common throughout the broader circumpolar region, where smaller settlements are more common. However, behind the cities' apparent similarities lies immense distance in terms of transport connectivity and socioeconomic development.

Vorkuta's population is in decline. It has one of the highest rates of emigration in Russia. According to the last Soviet census, in 1989, the city's population (without adjoining settlements) was 100,200. The larger metropolitan area administered by the Vorkuta City Council included the satellite communities of Vorgashor (18,500), Severny (17,000), and several others. This larger region, including the satellite communities, had a population of 216,200 people. Vorkuta, as the major population center, provided medical and other vital services to communities as far as Inta, more than 300 km away. In 2016 the population of the metropolitan area had fallen to only 81,400, with 59,200 in the city of Vorkuta, 10,000 in Vorgashor, and 8,400 in Severny. Thus, over the past thirty years the city of Vorkuta has lost almost half of its inhabitants while the population of the greater metropolitan area has shrunk by two-thirds.

In contrast, Salekhard is one of the most rapidly developing urban centers in Russia. Its population grew from 24,900 in 1989 to 48,700 in 2017, and has become one of Russia's wealthiest cities per capita. The city of Labytnangi, separated from Salekhard by the Ob River, had an initial decline in population in the early 1990s, but has stabilized to around 26,500. The settlements of Kharp and the Indigenous village of Aksarka house an additional 10,000 inhabitants.

The same dramatic differences are observable in contemporary indicators of well-being within the cities. In 2016 the average monthly salary of workers in Vorkuta was only 30,300 rubles, while in Salekhard the average was nearly three times larger, at 88,500 rubles. This economic disparity impacts the cities' budgets; the 2016 per capita municipal budget in Vorkuta was only 43,300 rubles, while Salekhard spent 116,200 rubles per person, according to the Federal Service for State Statistics (Rosstat) database. The age structures of the cities' population provide a further contrast, in part reflecting the economic situation. Vorkuta has a much older population, while Salekhard has a higher share of population younger than age eighteen. These divergent trajectories of development are rooted in the geographic position and economic functions of each city.

Speaking about frontier resource cities, Alaskan economist Lee Huskey identified the possibility of a leap from an unstable resource-based economy to a more sustainable economic structure, via what Huskey calls the Jack London effect (Huskey 2017). The essence of this effect is that during the boom phase of resource extraction and accompanying growth of the economy of the frontier city, it is possible to accumulate a critical volume of local population and local demand. When the volume of local demand surpasses the critical

point (considering economies of scale), local production becomes more profitable than importing certain goods and services. As a result, the local economy becomes more diversified and, consequently, more stable. As Huskey describes it:

> The Jack London hypothesis can be stated as "Resource development changes the support sector in ways that last beyond a particular resource boom and encourage future economic activity." The first part of the hypothesis was tested by comparing the changes in the support sector of the Alaska economy to changes in the overall economy and its staples component. . . . As London predicted, the support sector was changed in ways that lasted beyond the resource boom. Economic resilience in northern resource-based economies is still a concern. . . . The boom-bust story predicts that finite resources place a limit to the growth of the local economy. The Jack London hypothesis presents the possibility of a more optimistic post-resource-boom story. Structural changes that occur during the resource booms may change the economic environment in ways that promote future opportunities. Local policymakers may wish to pay attention not simply to resource development but also to the part of the economy that is left behind after the boom. (Huskey 2017: 344)

The driver for Vorkuta's economic development was coal mining. Stalin's government founded the city using forced labor in the 1930s as the country prepared for possible war with Germany. During the postwar Soviet period, the city experienced the Jack London effect, and became an important center for providing social, cultural, and educational services. The city developed a factory producing apparel, various forms of agriculture, and significant research centers. The accumulated local knowledge in the fields of northern construction, planning, architecture, permafrost, and ecology was critical for long-term sustainability. While Vorkuta did not become an official administrative center, it won the privileged status of a city of republican subordination as early as 1943, and later became a city district, benefitting from budgetary independence and self-management to the maximum extent possible within the Soviet and Russian economic systems.

Salekhard has followed a different trajectory. For centuries it was both the economic center of the Lower Ob River and the region's commercial and cultural center. Several merchant dynasties developed in the area, and periodically Salekhard experienced small bursts of development in export industries such as fishing, fur-trading, and even railway construction. The development of extensive oil and gas production in the eastern districts of the Yamal-Nenets Autonomous

Okrug transformed its economic role. Against the backdrop of the rapid growth typical of resource cities during the boom phase of their development, Salekhard changed from a local center into a major recipient of budget transfers, and therefore the wielder of powerful administrative authority. During this process, the city shed some of its previous functions, such as training agricultural personnel. In recent years, there have been some attempts to develop new locally oriented sectors, including scientific research, education, and food production in Salekhard. But these amount to nothing more than a half-hearted attempt to restore the previous achievements of Salekhard before the current fossil fuel boom.

Measuring Sustainability

We find the key indicators for measuring sustainability in Vorkuta and Salekhard to be connections to the outside world, economic diversity, urban design, and attachment to place. These four metrics provide a convenient way to understand the different paths that the two cities represent, showing the strengths and weaknesses in each urban area.

Transport Connectivity

The differences in transport connectivity linking Vorkuta and Salekhard to the outside world had a dramatic influence on the development of these cities. Transport connectivity is an important element of the quality of life in Arctic cities and can be a key factor that inhibits or stimulates their development (see chapter 8 for an in-depth discussion of this topic). The critical importance of transport connectivity between northern cities and regions that are more densely populated is even reflected in the Russian language. Colloquially, inhabitants of northern regions compare the North to *Materik* (mainland) Russia, or to the *Bolshaya Zemlya* (Great Earth), referencing the island characteristics of extreme isolation from the rest of the country. In the scientific literature, the North is usually contrasted with the main zone of settlement (Kosmachev 1974; Slavin 1961).

The example of Salekhard vividly demonstrates the relationship between socioeconomic development and transport connectivity. Salekhard differs from other administrative centers in the Russian Arctic, as well as from its geographic neighbor Vorkuta, in its relative isolation from its respective region. At first glance it may seem surprising that Salekhard—the capital of one of the richest

regions of Russia—has worse transport access conditions than a provincial industrial center like Vorkuta. However, Salekhard, as the capital of the Yamal-Nenets Autonomous Okrug, is in fact disconnected from the main economic production areas within its own region. One can even say that Salekhard is located in the middle of nowhere in relation to the largest cities and industrial centers of the Yamal-Nenets Autonomous Okrug—Novy Urengoy, Noyabrsk, Nadym, and others.

Currently, from the perspective of transport accessibility, Salekhard is an island city: it can be reached almost exclusively only by air with connections to Moscow, Saint Petersburg, large cities within the Yamal-Nenets Autonomous Okrug, and a few others. Other forms of transportation links are ferries (in summer) and ice/winter roads (in winter). Winter roads link Salekhard to Nadym and the resource-rich eastern and northern part of the district, but this mode of transport can be dangerous and unreliable. The main ground access channel to Salekhard is a ferry crossing over the Ob River to the city of Labytnangi, which houses the terminal railway station. About an hour-long trip to the railhead, it would seem, is quite a favorable situation for Northern inhabitants. However, seasonal changes greatly inhibit the accessibility of this rail station. In summer the Ob is crossed by ferry and in winter by car on the ice-road. In the autumn and spring, when the ice is not thick enough to reliably withstand the weight of cars and the operation of ferries is not possible, Salekhard's primary connection with the city of Labytnangi and the railroad is by small hovercraft (figure 2.1). These are inconvenient for passengers because they have relatively low carrying capacity. The spring brings its own challenges since the slow breakup of the ice can hinder even the operation of the hovercraft, because its surface becomes choppy and uneven. In these scenarios, helicopters are sometimes used to transport people across. During this period there can be shortages of fresh food in Salekhard (as interviewees told us in November 2016), which numerous studies show is an important factor that influences the subjective quality of life in the Arctic. Unfortunately, this issue is not often reflected in official statistics and research papers.

For many years there has been discussion about the construction of a bridge across the Ob, but the prospect is intimidating. Building a bridge across this river—one of the most powerful in the world—would be expensive and challenging. Not only would the structure need to span more than 2 km, but it also would have to be built to withstand the enormous force of the annual ice dams, which form during the spring melt. As the river gradually thaws from south to

Figure 2.1 | *Seasonal transformation of the crossing of the Ob River between Salekhard and Labytnangi. Photographs by Nikolay Shiklomanov.*

north, ice floes are carried north by the current until they jam and pile behind still stable ice cover. These ice dams have the potential to become so dangerous to infrastructure that they are sometimes preemptively removed with explosives.

In summer, there is one additional, longer, ferry route linking Salekhard to the railhead at Priobye Station. This ferry must travel south, against the current of the Ob River, for more than forty-eight hours. It is used almost exclusively for the transfer of vehicles from Salekhard to the more southern regions where there are connections to the national road network. Immigrants, especially those moving to the North for high-paying employment, will often ship their vehicles for use while living and working in Salekhard, but retain a residence and vehicle registration in their southerly home region. Such behavior is indicative of nonpermanence and is observable among some population of the Russian Arctic. Many workers are attracted to the North for high wages during periods of economic growth, and plan to eventually retire to the South. These skilled workers are also likely to have the means and desire to emigrate, should economic prospects become tougher.

It is obvious that the cost of cargo or transit to and from Salekhard is more expensive than in cities directly connected with the larger Russian railway and automobile networks. Therefore, along with other isolated cities of the Russian North, Salekhard is one of the most expensive in terms of prices for food and services in the Yamal-Nenets Autonomous Okrug, and even in Russia. Table 2.1 compares several cities and districts within the Yamal-Nenets Autonomous Okrug,

Table 2.1 | *Prices of various consumer food products within the Yamal-Nenets Autonomous Okrug and its subdivisions*

	Products (Rubles 2017)							
Location	**Beef**	**Chicken**	**Butter**	**Flour**	**Rice**	**Potatoes**	**Carrots**	**Apples**
Yamal-Nenets Autonomous Okrug	412.77	186.01	305.53	45.4	83.59	31.29	37.07	113.11
Salekhard (City)	416.67	190,86	398.04	48.95	89.9	30.67	35.33	121.25
Labytnangi (City)	370	149.49	230.04	41	77.99	32.71	36.67	119
Novy Urengoy (City)	354.75	159.32	312.45	39.65	67.75	25.72	31.12	101.85
Noyabrsk (City)	348.09	141.63	327.2	33.75	56.65	22.17	30.53	87.13
Gubkinsky (City)	300	151.5	181.33	42.61	69.26	24.06	32.38	80.73
Nadym (City)	429.58	173.3	529.67	41.07	97.63	24.89	38.81	95.54
Muravlenko (City)	321	164.14	253.59	38.22	60.31	22.06	30.89	91.46
Purovsky District	315	170.57	259.31	35.49	77.37	26.48	35.05	96.53
Priuralsky District	455	203.22	320.56	57.88	96.5	40.5	40	127.25
Tazovsky District	348	197	224.86	40.71	94.99	30.86	36.57	123.29
Yamal District	515	258.82	341	58.59	108.5	45	46.11	149,44
Krasnoselkupsky District	590	197.6	189.8	51.5	95.64	28.25	29.32	119
Nadym District	539	224	479.03	50.35	90.18	40.56	52.6	144.35
Shuryshkarskiy District	476.67	222.67	230.5	55.76	87.63	44.17	43.6	126.67

Source: Open Data Portal of Russia 2018.

showing that only the neighboring Yamalsky and Priuralsky Rayons (Districts) have higher food prices than Salekhard. These regions are even farther away from the railroad, and the modes of delivery of goods to them is further complicated.

The current economic situation in Vorkuta is significantly worse than that of Salekhard, but its transport connectivity is better due to its geographic location. With a high degree of probability it can be assumed that, if Vorkuta were less accessible, the current economic situation in the city would be catastrophic. In other words, the transport connectivity has a multidirectional impact on Vorkuta and Salekhard: Salekhard has powerful drivers of economic development (see below) and that development or growth occurs despite the city's isolated position. In Vorkuta drivers of economic development have deteriorated, but apparently the established railway connection—and reduced transportation costs—have somewhat slowed the decline.

Vorkuta acquired the railroad due to extraordinary circumstances. The connection of Vorkuta with the main zone of the country by a full-fledged rail link made the delivery of cargo much cheaper and put an end to the extreme isolation of the northern city. An all-season road connection between Vorkuta and the rest of the world, however, does not exist. Vorkuta was developed primarily as an industrial center, and for the extraction of coal. For industry, the railroad connection was much more important than an automobile link, because relative transportation costs for heavy goods were reduced.

Overall, we find that the transportation indicators included in ISO 37120 do not provide much insight to the problem of isolation that we discuss here. The transportation indicators focus on the extent of public transportation within a city. Such metrics certainly make sense when examining how much local transportation a city provides to its residents and that number helps determine the extent to which a city is sustainable. However, the exclusive focus on those measurements requires the assumption that the cities themselves are linked to a well-developed transportation network. In the Arctic context that assumption does not hold across cities and instead should be an object of measurement. In this sense the ISO is missing a way to measure the remoteness of a city, which is crucial to measuring its sustainability in Arctic circumstances. The only indicator along these lines is commercial air connectivity, which counts the flights arriving and departing from the city. While such flights are crucial for the city economy, they give only a partial picture of the remoteness of a city and its ability to sustain itself.

Economic Diversification

Another key factor promoting the sustainability of Arctic cities, particularly those in Russia, is the balance among three main sectors of their economy: the presence or absence of resource-oriented industries primarily concerned with exports, administrative centers, and locally oriented economic sectors. These economic attributes have fundamentally different effects on the sustainable development of the cities. The division of the urban economy into these three sectors is not a common practice in urban development research. The expediency of such an approach arises from an analysis of the literature on remote communities and is fully confirmed in the examples of Vorkuta and Salekhard (Danson and Souza 2012; Huskey 2005, 2006; Huskey and Morehouse 1992; Taylor et al. 2016).

The *resource-oriented industries* primarily concerned with exports make the city's economy dependent on conditions affecting international commodities markets. Resource-oriented cities, especially remote ones, are therefore subjected to boom-and-bust cycles, depending on macroeconomic conditions, and have large fluctuations in their budgets. Such vulnerability to external conditions naturally reduces the sustainability of Arctic cities because they are reliant on factors beyond their control.

The *administrative centers* are generally the most stable: Even during periods of severe economic downturn, they retain a relatively constant level of budgetary financing. Unless there are higher-level decisions to change administrative and territorial structure, these cities always retain a certain percentage of funds. Of course, their well-being also depends on economic cycles, because in the lean periods of economic downturn, budgetary opportunities are obviously in decline. However, in general such recessions are still milder than those in industrial centers that specialize in the production of one good.

Locally oriented economic sectors are also related to the stability brought by cities' functional specialties. However, the locally oriented industries only partially offset volatility associated with export-oriented economies. The collapse of the main resource industry, as well as changes in the political regime, may also have a profound influence on the development of the locally oriented sectors of the economy, as seen in both Vorkuta and Salekhard after the collapse of the Soviet Union.

Although Salekhard began from a small locally oriented economy, the booming gas economy and the political reorganization of

territories in the late 1990s/early 2000s saw the city transform into an important administrative center. With this new role as regional capital the city enjoyed stability in its economic prospects, even in the face of fluctuating gas prices—which is the region's primary export commodity. However, this administrative specialization has been developed at the cost of some locally oriented industries that were labeled unprogressive.

Vorkuta, on the other hand, was founded and built purely as a resource-oriented economy specializing in coal. While Vorkuta grew, it underwent the Jack London effect, and began to fulfill many functions of an administrative center. Though Vorkuta expanded and remains larger than Salekhard, it never gained true administrative status and thus remained under the authority of regional and national leaderships. This lack of self-governing authority with guaranteed income meant that the city was not able to compensate for the collapse of the coal mining industry. Though a locally oriented industry had developed in Vorkuta, it was not at a scale large enough to sustain the city.

One area where Vorkuta has moved ahead of Salekhard is in small business development. The Vorkuta administration has allowed local residents to engage in a wide range of business activities, essentially as a survival method. This has led to a profusion of cafés and other service industries in the city. The city administration in Salekhard maintains tight control over the local economy, providing fewer opportunities for individual citizens to engage in developing their own small-scale entrepreneurship.

A more detailed examination of the cities' age structure and level of employment concentration gives additional insight into the level of economic diversity. As mentioned earlier in this chapter, the age structure of these cities is highly indicative of the economic situation. While Vorkuta and Salekhard have a similar number of working-age citizens, accounting for about 64 percent of the population in 2016, Vorkuta has a much larger proportion of pensioners compared to Salekhard (figure 2.2). This difference can impact the cities' ability to levy taxes and generate revenue from the working-age population.

For the past several years the employment concentration in Salekhard and Vorkuta has been dynamic, revealing several interesting trends. In both cities several major industries tend to dominate the economy (figure 2.3). However, Salekhard has seen a relatively stable employment concentration over the past decade, while Vorkuta's employment situation has been much more volatile, with surges in

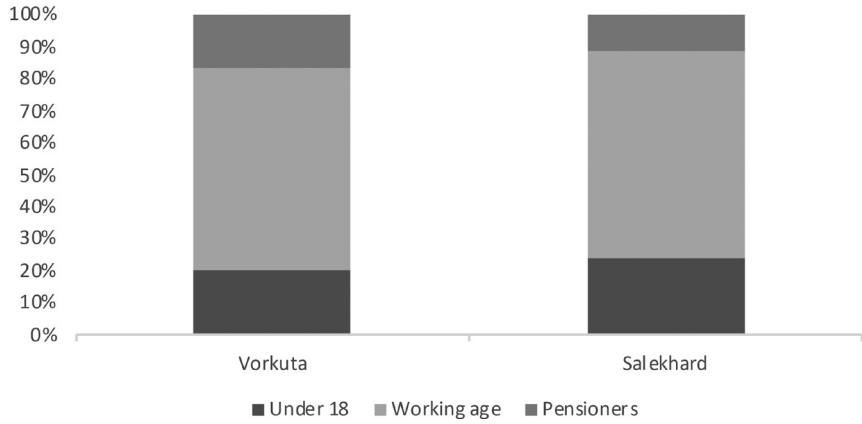


Figure 2.2 | *Vorkuta and Salekhard population age structures. Figure created by the authors.*

the construction and transportation sectors along with declines in the mining sector and several other secondary sectors. Typically, workers in Vorkuta earn significantly less than those in Salekhard across all sectors. Both cities are characterized by the dominance of a few major industries, with the largest three sectors accounting for more than 50 percent of employment. It is especially significant that the highest paying sector in Vorkuta—real estate, at 78,273 rubles in 2016—employs less than 5 percent of the population. In Salekhard the high-paying public administration sector employs 26 percent—the greatest share of the population and pays 121,405 rubles. These economic disparities are the foundational difference between these cities, and Salekhard is much more economically sustainable in this sense.

As with the transportation indicators, the ISO metrics do not consider the diversity of a city's economy in measuring its sustainability. Rather, the indicators focus on measures of unemployment, the assessed value of commercial and industrial properties, number of businesses, number of patents, and number of hotel night stays. The ISO does track population demographics, including a profile measure for the number of pensioners.

Overall, a measure of economic diversity would be crucial to identifying a city's reliance on one industry for its survival. This is a major problem in the Arctic overall and in Russia in particular. One-industry towns are extremely vulnerable to gyrations in international commodity markets and therefore have little control over their own fate. While levels of employment give a general picture of a city's economic

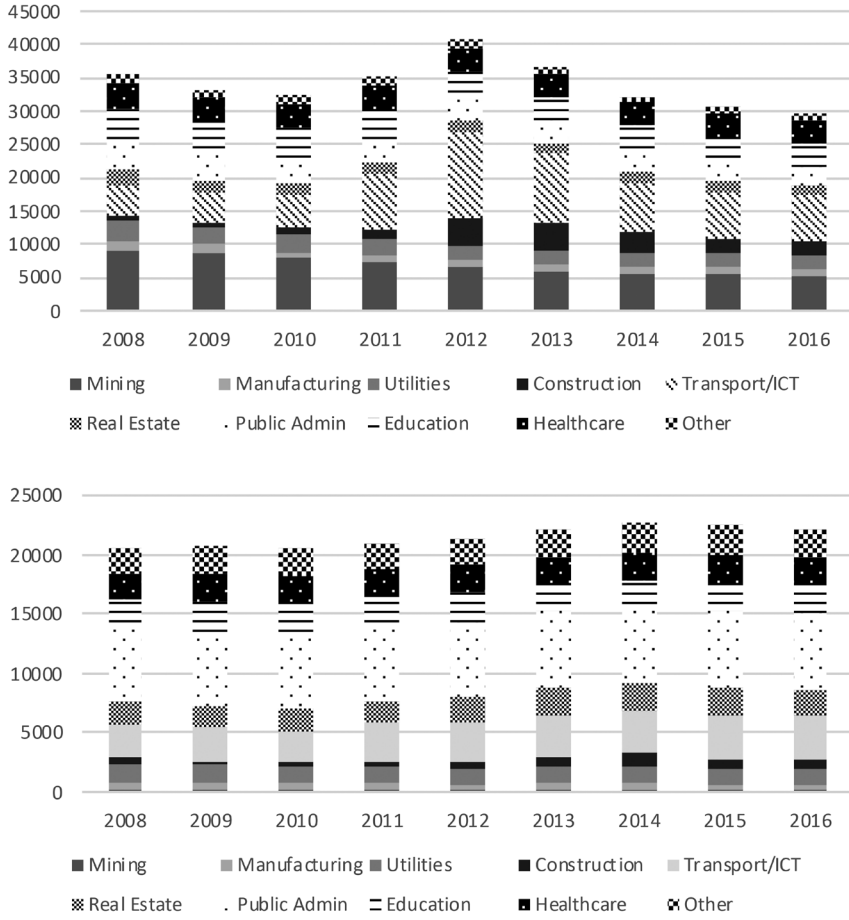


Figure 2.3 | *Vorkuta and Salekhard employment concentration. Figure created by the authors.*

health, understanding the city's ability to survive over the long term requires a more comprehensive picture of economic diversity in the city.

Urban Landscape

Urban design has played a key role in the sustainability performance of Vorkuta and Salekhard. The peculiarities of both cities' functional specializations and economic development propagated dynamic urban planning changes that took the cities in different directions.

Figure 2.4 | *Ruins of the abandoned Vorkuta Ring. Photographs by Luis Suter and Nikolay Shiklomanov.*

Vorkuta benefited from the way that it developed. At the center was the core city, which hosted the key functions. Around an outer ring were approximately a dozen coal mines, with as many as ten thousand individuals living in settlements near the mines. Since the 1990s Vorkuta has experienced intense compression of urban space, promoted by programs such as the Northern Restructuring Project financed by the World Bank and Russian federal government. The central core, in general, was preserved, but most of the settlements in the ring were closed and abandoned. After residents moved away, these buildings were often purposefully destroyed to discourage informal use (figure 2.4).

It should be noted that the concentric design of the Vorkuta agglomeration can be considered a success; it allowed for the relatively easy transition to a more compact version of urban planning following a drastic reduction in the population, without much emptiness in the fabric of urban space. While the gloomy ruins remain on the periphery, the city has been able to maintain a relatively comfortable urban environment in its center. In this respect, the urban landscape of central Norilsk has changed more dramatically, but the cause of the destruction was largely due to the influence of permafrost processes rather than to the mass migration of population. The urban areas of central Vorkuta remain pleasant and active, making the city seem rather vibrant. Nevertheless, even in the city center the repairs cannot hold back the degradation completely, with damaged or abandoned buildings sometimes directly flanking their still-inhabited counterparts (figure 2.5).

Salekhard, in contrast, has undergone significant spatial growth, especially in the downtown area. After the arrival of the regional administrative organizations, the city began to build up a business district on the right bank of the Shaitanka River. Most of the old part of Salekhard, on the headland between the Polui and Shaitanka

Figure 2.5 | *Downtown Vorkuta. In downtown Vorkuta it is common to see neighborhoods with completely abandoned structures (top left) next to inhabited units being repaired (above) alongside newly constructed dwellings (left), providing stark contrasts. Photographs by Luis Suter and Nikolay Shiklomanov.*

Rivers, was converted into a historical and cultural area with museums, educational institutions, offices, and hotels. Additionally, there has also been significant private developments, for example the area just above the mouth of Polaibta flowing into the Polui River. Here the city also built a public beach that, although unexpected for anyone unfamiliar with life in Arctic cities, was highly appreciated by the townspeople. Beach accessibility is a criterion for a high quality of life desired by both Soviet and post-Soviet people in the North, leading to the construction of beach zones in many cities of the Yamal-Nenets Autonomous Okrug, and even in Norilsk. In this area, a luxury cottage development was also built.

The cityscape of Salekhard continues to grow and change quite dramatically, with construction sites common across the urban landscape (figure 2.6).

In the city center of both Vorkuta and Salekhard, a rather positive scenario has been realized. Vorkuta, thanks to the concentric structure of the agglomeration, effectively avoided holes and ruins in the central squares, the historical nucleus of the city on the banks of the Vorkuta River, and along the railway, with some exceptions. The degradation occurred mainly in the satellite settlements. In terms of the prospects for future urban development, we can consider, given the severity of the process, such concentration to be an ideal option to smooth the city's shrinking phase.

Salekhard, with the advent of the new business district, managed to avoid the degradation of the old city center and retained a traditional

Figure 2.6 | *Downtown Salekhard. Photograph by Luis Suter and Nikolay Shiklomanov.*

urban environment. In this sense, the somewhat ambiguous removal of government buildings into a clean field seems justified. A distinctive feature of Salekhard, compared to other cities of the Russian Arctic, is the presence of private development—mainly in the area along the Polui and Polaibat Rivers. Residents of these private homes often conduct small-time agriculture, growing potatoes and vegetables. Thus, these two neighborhoods, in a sense, represent two stretches of "traditional" Salekhard, while the place between them along the Shaitanka has turned into the façade of the capital of the Yamal-Nenets Autonomous Okrug. This neighborhood also contains significant symbols of the power of the city administration.

However, Salekhard is not without challenges, particularly in the sphere of housing. The continued construction of government buildings in the large downtown park could well occupy and exhaust resources necessary for building residential units. Though the city has continued to build residential space, in 2016 there were still 1,709 families registered as in need of housing. The number of citizens receiving state support for housing in Salekhard has steadily risen, nearly doubling from 5,347 in 2008 to 10,255 in 2016. The city has been addressing this problem, commissioning an average of 32,850 square meters (m^2) of new housing per year since 2006, when records began. In contrast, Vorkuta has reduced the number of families in need of housing from 6,038 in 2006 to only 210 in 2017, while only adding about 1,100 m^2 of new housing per year.

Although ISO 37120's core urban planning metric involves measuring green space, which is not relevant in discussing this city, certain ISO urban planning profile indicators can be usefully applied to Vorkuta and Salekhard. Results for indicators evaluating population density per square kilometer and built-up density as seen in table 2.2 reveal important differences between these two cities. The indicator data show that Salekhard is much more densely populated and boasts greater building density than Vorkuta, suggesting that the natural gas city is much more likely to be sustainable than its coal-producing cousin.

Table 2.2 | *Urban planning indicators for Salekhard and Vorkuta*

City	Population density per square kilometer (ISO 37120: 21.5.1)	Built-up density (ISO 37120: 21.5.3)
Salekhard	48	0.93
Vorkuta	3	0.065

Source: Calculated from Rosstat.

Attachment to Place

During the rapid decline of Vorkuta in the 1990s and 2000s, many experts predicted the city's disappearance (Barenberg 2014). However, this has not been the case, and the city looks increasingly likely to exist in some form far into the future. Most planners expected programs such as the Northern Restructuring Project to be far more effective, but the implementation was limited in part by the attachment to place that had built up over the years in these communities. There is a distinct sense of pride in the history of Russia's northern cities, their contributions to national well-being, and their toughness. Given its basis in emotions rather than rationality, this sense of connection with a city or region is extremely difficult to quantify, but is a critical factor influencing the long-term sustainability of these cities. In Vorkuta especially, this pride of place is self-evident in the form of advertisements of proud coalminers and the branding of the city as a capital of the North.

This attachment to place and local pride in the city further resulted in several tangible efforts to improve its sustainability. While funding for such initiatives is scarce on regional and national levels, local administrations have undertaken several popular initiatives to improve the quality of life in the city. One notable project started by the popular mayor Igor Shpektor in the 2000s involved the fertilization of large swaths of green space, including derelict building sites. Warming climate and fertilization efforts allowed the growth of trees, which are not normal for the tundra environment, and have noticeably changed the urban environment. This greening of the city represented an ideological step forward for Vorkuta, which had often been labeled as hopelessly polluted and ugly (figure 2.7).

While ISO 37120 does not directly measure attachment to place, it does seek to measure some proxy variables. In this case the number of trees per hundred thousand population (ISO 37120: 21.5.2) could be a good measure of attachment to place, drawing on the assumption that cities where people plant more trees have greater attachment

Figure 2.7 | *Evidence of greening in Vorkuta's central park from time-lapse photos. Photographs by Luis Suter and Nikolay Shiklomanov.*

than places where there are fewer trees. Unfortunately, we have not been able to count the number of trees in the cities where we are conducting research, but hope to do so in the future.

Other Sustainability Indicators

Salekhard has a better outlook when considering other statistical indicators of urban sustainability identified by ISO 37120. Health-care services are much more available in Salekhard than in Vorkuta, with about 20 percent more doctors and nurses per capita. Salekhard has nearly twice as many residents with higher education degrees per capita than Vorkuta.

Vorkuta is highly polluting, producing 2.21 tons per capita of carbon dioxide equivalent per year since 2008, compared to Salekhard's 0.05 tons per capita. This statistic is slightly biased given the two cities' legacies and economic specializations. Coal is inherently more polluting and therefore, it is obvious why the level of pollution in Vorkuta, whose heating is based on the use of coal, has a higher level of pollution. However, Salekhard's economy depends heavily on the extraction of oil and gas and these fossil fuels are consumed and burned elsewhere, contributing to climate change and driving ongoing processes that negatively impact Northern regions. While Vorkuta pollutes far more as a municipality, these statistics do not fully account for each city's contribution to fossil-fuel-related emissions.

One factor that is important to the Arctic, but that is not considered in ISO 37120, is permafrost. Two permafrost monitoring sites located near Vorkuta report one of the largest increases in thaw depth in Russia since the beginning of measurements in 1996. Likewise, the non-permafrost areas near Vorkuta show a shortening of the seasonal

freezing period and a decrease of the freeze depth of almost 1 meter (m) over the past fifty years (Streletskiy et al. 2015). The increase in the thaw depth and increase in permafrost temperature is also evident in regions of West Siberia, including the area near Salekhard; that thaw has been especially evident since 2010. These changes are driven primarily by the ongoing increases in air temperature west of the Polar Urals and by both temperature and snow increases in West Siberia. These changes contribute to the damage of infrastructure built on permafrost, as the ability of foundations to support buildings and structures decreases (Streletskiy, Shiklomanov, and Nelson 2012). The capacity of the ground to hold the foundational piles on which buildings are anchored has declined in both cities as temperatures have warmed. This bearing capacity is projected to decrease an additional 30 percent by the middle of the twenty-first century. Combined with anthropogenic factors—including maintenance—these environmental changes can have profound impacts on the urban landscape and sustainability.

Conclusion

In assessing the urban sustainability of these two cities, it is critical to use a mixed-methods approach. The ISO 37120 urban sustainability indicators provide a useful quantitative basis from which to comparatively analyze two Arctic cities within a country, where equitable statistical indicators are available. However, such measures must be combined with qualitative data that addresses the context of historical developments and ongoing processes in order to comprehensively evaluate the sustainability of an Arctic city. Measures such as employment concentration can be used to describe and visualize the current state of a city and reveals interesting patterns about the stability of the economy. Similarly, we must also regard statistical measures such as a city's carbon dioxide concentration within the larger context of the region's economy, as in the case of Salekhard where the emissions do not reflect the economy's profit from fossil fuels. Unfortunately, such statistical measures cannot fully describe how these conditions developed. For such an analysis, the context of historical and ongoing processes—economic, social, and political—are necessary. Such context is best provided by communications with local peoples, historians, and policymakers, and stresses the importance of field work and experiential research in these unique locations.

Some of the most critical components of this analysis, from the description of historical processes to the concept of attachment to place, can only be studied through travel to these places and interactions with people who live there. Cities evolve and change, and these changes are often not reflected in the official statistics collected every year. Moreover, statistics cannot describe how inhabitants feel about their cities; in the case of Vorkuta inhabitants' opinions are one of the strongest remaining stabilizing forces within the city. Many scholars have argued that, according to logic, the city should have closed or relocated years ago, but a strong sense of pride in the city's past and present toughness fights against this logic.

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Notes

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2. In Vorkuta the experts were: 1 and 2: two employees of the municipal administration: the head of the Youth Department and an adviser to the head of administration; 3) the chief architect of the city and 4) his staff and 5) an employee of the Vorkuta Mining and Economic College. In Salekhard we interviewed the deputy director of the Arctic Research Center of the Yamal-Nenets Autonomous Okrug, two employees of the local museum center, and the head of the Youth Department (the last was a telephone interview).

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CHAPTER 3

Norilsk

Measuring Sustainability in Population Size and Well-Being

Marlene Laruelle

Introduction

A complex process with several bottom-up and top-down dynamics, urban sustainability remains difficult to assess. Identifying accurate measurements depends on the definition of sustainability, as well as on the national context and historical trajectory of each city. To discuss these interactions this chapter focuses on a city considered one of the least sustainable in the world: Norilsk, the northernmost city built on permafrost, a former Gulag, and Russia's most polluted city, with a highly negative environmental footprint. Norilsk epitomizes the sustainability challenge of industrial cities built to exploit resources, whose future depends on the availability of that resource as well as international demand for it.

Some may consider that Norilsk's continued existence does not make sense in light of its environmental footprint, and therefore say its sustainability objective should simply be to disappear. Yet national context matters: There is no way that Russia, which plans to make the Arctic its resource base for the twenty-first century, as then-president Dmitry Medvedev said in 2008 (Arctis Knowledge Hub 2009), would stop exploiting the resources of its huge Siberian landmass. A new Arctic urban sustainability project launched by the expert group Pora and Moscow State University's Faculty of Economics recognizes that sustainability in Russia has to be understood as being balanced

against the fact that the conquest (*osvoenie*) of the Arctic—in the sense of exploiting its resources—remains a national priority. This reality leaves no room for the "eco-utopia" of a clean environment with no human and industrial footprint ("Poliarnyi indeks" 2018).

Although shaped by a Soviet legacy of heavy industrialization, some Russian cities have nevertheless been able to improve their overall sustainability. Looking at six big cities in the Asian part of Russia (Yekaterinburg, Novosibirsk, Krasnoyarsk, Omsk, Irkutsk, and Khabarovsk), Fan et al. (2018) conclude that these urban areas have experienced enhanced economic growth despite having a declining population, and that they balance economic development with environmental awareness and social advances. Cities such as Norilsk, however, find it more difficult to strike this balance: Based as they are on a single extractive industry, they struggle to achieve economic diversity.

Since traditional definitions of sustainability are a poor fit for Norilsk, more-modest goals should be sought. This chapter defines the following sustainability goals for the city: (1) Reducing the industries' negative environmental footprint; (2) Planning a progressive shrinking of the population in order to make the city small and efficient, organized around a limited but skilled workforce; and (3) Improving the well-being of the population.

Collecting data on Norilsk poses at least four challenges. First, Rosstat offers rich data at the level of each administrative subject of the Russian Federation, but not systematically at the municipal level. Local administrations do collect their own data at the city level, but they do not do this in a consistent way across the country. Second, regular institutional reshuffles at the federal level may impact data collection. The dismantlement of the Federal Migration Service in 2016, now integrated into the Ministry of the Interior, for instance, has limited collection of and access to data on migration flows (Glavnoe Upravlenie 2018). Third, municipal authorities can choose whether to make data publicly available depending on the status of the city and the level of securitization they deem necessary. Since Norilsk is considered a "strategic object"—a term used by Russian authorities to refer to critical military and industrial assets—information about the city is more controlled than data about cities that are more open, such as Murmansk. The city is also restricted to foreigners, who are allowed to visit only after obtaining a permit from the Federal Security Service.

Last but not least, the City of Norilsk has undergone several changes in its administrative status that often blur the available data. In 2004

the three satellite towns of Talnakh, Kayerkan, and Snezhnogorsk lost their city status and were incorporated into Norilsk. This process of combining towns is a classic tool used to streamline small settlements into larger agglomerations, especially at a time of demographic decline. The new entity is called Greater Norilsk or the Norilsk Industrial Area; Norilsk itself has become Tsentral'nyi, or the center. The data collected at the city level now includes the former satellite towns, complicating the comparison of statistics from before and after the 2004 status change. A few years later, in 2007, the Taimyr Autonomous District—to which Norilsk belongs—merged with the Krasnoyarsk Kray, becoming part of a huge region. As a result, some district-level data has disappeared: data on urban trends may now include other big cities such as Krasnoyarsk, and Norilsk is not always singled out.

This chapter introduces the city's trajectory and the main actors in charge of sustainability before delving into a series of indicators. It applies the ISO indicators for city sustainability and discusses their utility and the need to develop other indicators to capture grassroots activities, perceptions and behaviors.

Introducing Norilsk

With 178,000 inhabitants in 2017, Norilsk is the second-most populous city in the world built on permafrost after Yakutsk, making it a textbook case for discussing urban sustainability in polar latitudes. It is located in Central Siberia at 69°51' N latitude, above the Arctic Circle. It experiences the normal change between day and night for only 146 days; the rest of the year is divided between polar day (sixty-eight days) and polar night (forty-five days). The city is characterized by a harsh Arctic climate (the mean annual temperature is around −10°C), with only 84 days a year where the temperature reaches above freezing. In an average year Norilsk is covered by snow for 247 days.

The history of the city is illustrative of Soviet and post-Soviet population and urban management. In terms of population, it has experienced the three main stages common across the Russian Arctic: first the sending of a forced workforce—prisoners in the camps, or Gulag—to provide free labor; then the incentivization of (usually young) citizens to settle there with the promise of material benefits and promotions; and most recently the management of the post-Soviet market economy—which has seen mass departures from

Arctic cities and the arrival of foreign labor migrants to whom the region is still attractive—including by letting private firms rebalance their workforce needs. In terms of urbanism, the city provides a visual representation of several major trends in Soviet design, from the Stalinist neo-classical architecture of the late 1940s and 1950s to the prefabricated concrete panels of the 1960s, 1970s, and 1980s. Today it struggles to maintain this architectural legacy in the face of crumbling infrastructure and deteriorating environmental conditions, including urban heat islands and climate change.

The first prisoners to be sent to the Putoran Mountains, known for their copper-nickel sulfide ores, arrived in the early 1930s to complement a small settlement created a few years earlier under the auspices of scientific and geological expeditions led by Nikolay Urvantsev. The first Gulag camp opened in 1935 under the control of the Soviet secret police, the People's Commissariat for Internal Affairs. It remained relatively small until World War II, when the smelting plants of the Kola Peninsula, threatened by the German-backed Finnish army, were evacuated to Siberia. At its peak in the early 1950s, the Norilsk corrective labor camp, the Norillag, hosted between 50,000 and 75,000 prisoners, scattered across seventy camps laid out in eight vast complexes spread out over 5,000 kilometers (km) (3,100 miles) that spanned from the north to the south of the Krasnoyarsk region (Applebaum 2004). At that time, 68,000 of Norilsk's 77,000 inhabitants were convicts (Krichevskii 2010). Several thousand non-convicts, principally engineers, also worked there.

Starting between 1954 and 1956 and tapering until the end of the 1950s, the Norilsk de-Gulagization saw the progressive dismantling of the camps. Of the 500,000 people who spent some time at Norillag (Ebedzhans 1996), most eventually returned to European Russia or to their republic of origin. Some decided to stay, including those who had no other place to go or who wanted to continue working in the mineral extraction sector. In 1955 Norilsk became a city (Poluektov 2011), and its industrial complex was transferred from secret police supervision to the Ministry of Metallurgy. With the release of tens of thousands of prisoners, the city and the mining complex faced an abrupt labor shortage, which slowed down housing construction and mineral extraction. Concerned about this trend, the Soviet authorities decided to send the Komsomol (All-Union Leninist Young Communist League) to replace the Gulag workforce. In 1956 alone, during the sixth five-year plan, 29,000 Komsomol members arrived in Norilsk, a mass phenomenon referred to as the landing of the Komsomol (*komsomol'skii desant*).

In the 1960s rapid production increases turned Norilsk into one of the principal mineral producers in the Soviet Union, a trend accelerated by the discovery of the Talnakh deposits, 25 km north of Norilsk, in 1960. Around the same time, in 1963, Norilsk became a closed city, meaning that Soviet citizens could not visit without a professional or family reason. This was the city's golden age: Its population boomed from more than 100,000 inhabitants at the 1959 census to more than 250,000 two decades later. Workers were motivated by the significant material advantages offered: salaries were based on the Nordic Coefficient, with the highest in Norilsk (2.0, a double salary), and were supplemented by the *polyarki* (additional salary) based on the number of years spent in the Far North. There were also paid vacations in southern Russia (Gras 2013).

From that point until the collapse of the Soviet Union, wage increments were one of the driving forces behind the urbanization of the city and its satellites. These were complemented by growing efforts by the Soviet authorities to improve the livability of Arctic cities. From the end of the 1960s living conditions in Norilsk began to improve dramatically. Annual figures for housing construction doubled due to prefabricated construction technologies, and cultural life was vivid. These policies caused the population of Greater Norilsk (Norilsk and its two main satellite cities, Talnakh and Kayerkan) to increase by 55 percent between 1971 and 1980, a growth rate far exceeding that of the Krasnoyarsk Kray as a whole (21.2 percent) and even the Russian Soviet Federative Socialist Republic (17.8 percent). In 1971 Norilsk recorded the second-highest urban birth rate in Soviet Russia, a number explained both by the high natural fertility rate and by the arriving migrant population (Bond 1985).

In the 1980s, however, Soviet programs to stimulate social and territorial mobility slowed. Norilsk's migratory balance turned negative, with more people leaving than arriving. Large urban projects for new satellite cities never took off due to a lack of inhabitants, and have become ghost towns. Yet the population of Norilsk, accustomed to a certain quality of life under the protective umbrella of the industrial complex, felt the impact only at the fall of the Soviet regime in 1991. The city's closed status was repealed that year, and government subsidies were terminated almost from one day to the next (Zamyatina 2007). The collapse of state support and subsidies, combined with the company's struggle to transition to a market economy, accelerated the departure of all those who could find employment elsewhere in the country or who could shift to the emerging private sector. The city's demography declined dramatically: Its population

fell by 37 percent between 1989 and 2010, from 267,609 to 175,365 inhabitants.

Who Is in Charge of the City's Sustainability?

Norilsk can be considered the largest Arctic monocity, a designation that indicates that 25 percent of the city's population works in its primary industry, more than 50 percent of total town production is generated by this industry, and more than 20 percent of the municipal budget is dependent on it (Didyk, Ryabova, and Emelyanova 2014). Its foundational firm, Norilsk Nickel, is now Russia's largest mining company and the world's largest and lowest-cost producer of nickel. It accounts for 20 percent of global nickel production and, in Russia, for 90 percent of nickel, 55 percent of copper, and 95 percent of cobalt.

While private, the company is owned and run by oligarch Vladimir Potanin, a figure close to Vladimir Putin, making Norilsk Nickel a state-protected firm intimately connected to the Kremlin's policies. As one of the most important mineral centers of Russia, whose production is considered strategic to the Russian state, the City of Norilsk answers directly to Moscow, more than to Krasnoyarsk, even if it is part of the Krasnoyarsk Kray. This political proximity to the Kremlin offers advantages in terms of getting things done and securing state subsidies: Norilsk has, for instance, a relatively high municipal budget (17 billion rubles), exceeding that of cities such as Yakutsk and Murmansk, whose populations are almost twice as large. However, this protective policy toward Norilsk also constrains the city's ability to manage its own internal affairs (Humphreys 2011).

As a company town, Norilsk showcases a symbiotic relationship between the municipal authorities and Norilsk Nickel, with the latter providing about 90 percent of the municipal budget (City of Norilsk 2018c). The corporate identity of the city is evidenced by Norilsk Nickel's main administration being hosted in the most prestigious and imposing building in the city's downtown; the streets are also lined with billboards celebrating the mining firm's production. Norilsk Nickel supports many of the cultural activities offered in town, works closely with the Orthodox Church, and, in the early 1990s, funded a small commemorative monument on the site of the erstwhile Gulag (author's fieldwork and interviews with local associations and the city council, Norilsk, in July 2013 and July 2015). As we will see below, Norilsk Nickel also controls the demographics of the city by gradually shrinking its workforce. Norilsk Nickel is thus *the* central

actor of urban politics in Norilsk, while the municipal authorities find themselves in a subordinate position with limited decision-making autonomy.

Norilsk Nickel is also the main stakeholder in anything related to sustainability. Its environmental records are poor: the Blacksmith Institute (2013) includes Norilsk on its list of the world's ten most polluted cities, stating that 500 metric tons each of copper and nickel oxides, as well as 2 million tons of sulfur dioxide, are released into the air at the site of the Norilsk Nickel plant on an annual basis (data from 2007). According to Rosstat, Norilsk Nickel produced 1.8 billion tons of pollutants in 2016 (Goskomstat 2017d). Even if the plant cleans almost half of its emissions, the remaining pollution has contaminated the soil in at least a 60-km radius, creating a technogenic desert, and a large number of residents are exposed to particulates, sulfur dioxide, heavy metals, and phenols, leading to increased levels of respiratory diseases and cancers of the lungs and digestive system. Globally, the city epitomizes the obstacles to improving the environmental footprint of former Soviet industries: It is the most polluted city in Russia.[1]

This situation can be partly explained by the Soviet legacy: It is difficult and expensive to modernize the aging infrastructure left over from the Soviet period. But blame can also be laid at the feet of Norilsk Nickel due to its mismanagement of industrial waste. Until recently, the company was able to pay the—quite modest—financial penalties imposed for its pollution. However, new Russian environmental legislation passed into law in 2015 ("Rasporiazhenie Pravitel'stva" 2015) makes this more difficult: By 2023 the firm will be paying penalties 100 times higher than those it is paying today if it does not cut its emissions by two-thirds. This reality pushed the firm, in 2016, to close its old smelter (dating back to 1942), that had produced around 120,000 tons of refined nickel per year, while emitting 380,000 tons of sulfur dioxide annually (Norilsk Nickel 2016). It also decided to build a new $1 billion processing plant, to be completed in 2022, to convert the sulfur dioxide produced during the metal smelting process into gypsum, a safer product (Foy 2018).

More importantly, international environmental pressures, combined with the drop in the world prices of minerals, have contributed to a radical overhaul of the company's nickel operations, refocusing refining on the metallurgical complex of the Kola Peninsula and the Harjavalta complex in Finland (Staalesen 2016). In the case of a firm producing such a strategic material, only international pressure from investment funds—the firm is listed on the London Stock Exchange—is powerful

enough to force it to take such a drastic, costly measure. The decision directly impacts the sustainability of the city, not only in terms of its environmental footprint, but also in terms of its very survival: If extraction and processing factories close down, the future of the city, at least at its current size, will be called into question.

In such a context, the municipal authorities do not enjoy much room for maneuver. In 2017 the city council released a municipal program, Formation of a Contemporary Urban Environment (*Formirovanie sovremennoi gorodskoi sredy*), for 2018–22. This program does not use the term "sustainability" ("*ustoichivoe razvitie*"), though it does insist on several occasions on the need to improve well-being (*blagoustroistvo*). It defines the contemporary urban environment to be reached as being composed of eight pillars: (1) citizen participation (through the creation of a social commission for the development of the urban environment); (2) a holistic approach to the city's territories; (3) courtyards (*dvory*) as centers of everyday life; (4) the creation of public spaces that reinforce citizens' responsibility for the city's overall ambiance; (5) the individual responsibilities of landlords and political leaders in charge of programs; (6) attracting local producers and small and medium-sized enterprises to invest in the city; (7) the adoption of best practices; and (8) engaging the younger generation in the city's new design. As we can see, the city's plan remains focused on social and societal issues and does not address environmental challenges and industrial prospects, because they do not belong to its area of responsibility (Norilsk Nickel City Council 2017).

Sustainability Indictors

The ISO indicators for urban sustainability described in this book's Introduction give us a comprehensive idea of what it would take to assess sustainability in the context of Norilsk. In this chapter I leave aside the environmental indicators, on which Norilsk performs poorly, to focus on the two other criteria of sustainability discussed in the chapter introduction: planning a progressive shrinking of the population in order to keep the city small and efficient, organized around a limited workforce; and improving the well-being of the population, measured in terms of the indicators listed in table 3.1 and figure 3.1. Table 3.1 presents the available indicators for Norilsk: those that correspond to ISO norms, those that are similar but measured on a different scale, and those are not on the ISO list. Some indicators are known for the city, others are available at the regional level only.

Table 3.1 | *List of ISO and other indicators for Norilsk*

Demographic indicators	
11.1 Average life expectancy	70.1[a]
Population under 18 years old	24.3%
(ISO 13.4.3 Population under 15)	
Population over working age (55 for men, 60 for women)	9.2%
(ISO 13.4.3 Population over 64)	
5.1 Unemployment rate	5.00%
Health, housing, and crime indicators	
11.2 Number of in-patient hospital beds per 100,000 people	0.01416
11.3 Number of physicians per 100,000 people (data from 2007)	0.00785
11.5 Number of nursing and midwifery personnel per 100,000w people	0.02333
12.5.4 Living space (square meters) per person	24
Infant mortality per 1,000 births[b]	5.9
(ISO 11.4: under-5 mortality)	
Alcohol abuse rate per 100,000 people	743
11.6 Suicide rate per 100,000 people	16
15.8 Property crime total per 100,000 people	923.9
Violent crime total per 100,000 people	49.2
Juvenile violence total per 100,000 people	63.9
Cultural and socioeconomic indicators	
5.5 Number of businesses per 100,000 people	27.36
6.6 Number of higher education degrees per 100,000 people	0.00237
17.1 Number of cultural institutions and sports facilities per 100,000 people	292
Number of kindergartens, schools, universities, technical institutes[c]	90
Number of public gathering places per 10,000 people (indoor and outdoor)[d]	1.8
(ISO 14.2: square meters of public recreation space per capita)	
Percent of adults with postsecondary education	65.2
Broadband Internet penetration (number of households)	69%
(ISO 18.1 Internet connections per 100,000)	
Political indicators	
10.4 Voter participation in most-recent municipal election (as a percentage of registered voters)	16.5
Quality of life indicators	
19.5 Transportation deaths (regional level)—number of deaths by transportation per 100,000)	14.36[e]
Transport capacity of public transportation system (regional level)	20,610[f]
(ISO 19.6 percentage of population living within 0.5 km of public transport)	
Amount of food produced locally in rubles	2,660,514
(ISO 20. 2 Amount of food produced locally)	

Social inclusion indicators	
10.1 Women as a percentage of total elected to city-level office[g]	23.5%
Women in workforce	48.3%
Women's salary compared to men's salary	69.6%
13.4.4 Percentage of population that are new immigrants	0.9%
13.4.5. Percentage of city population that are noncitizens	0.7%[h]
13. 3 GINI coefficient (regional level)	0.392[i]
13.2 Number of people under poverty line (regional level)	18.7[j]

Source: Data compiled by the author and Alexandra Poturaeva.
Notes: The ISO indicators are indicated by their number: 5.1–19.5.
[a] "Prodolzhitel'nost' zhizni" 2015.
[b] City of Norilsk 2014.
[c] City of Norilsk 2017a.
[d] Document no longer available.
[e] FedStat 2015.
[f] City of Norilsk 2017b.
[g] City of Norilsk 2018b.
[h] "Gost' v zakone" 2016.
[i] Fedstat 2017.
[j] Goskomstat 2016.

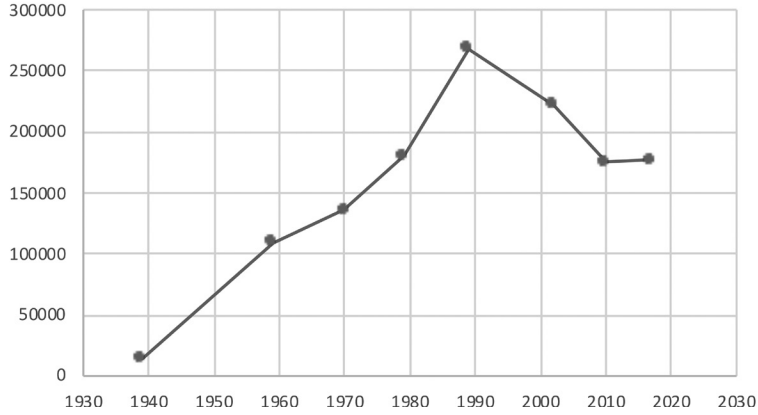

Figure 3.1 | *Norilsk population from 1939 to 2017: rise, decline, stabilization. Figure created by the author.*

Planning Progressive Population Shrinkage

For a city like Norilsk, demographic sustainability means finding a way to keep the city population small and efficient, organized around a limited but qualified workforce and free of people who are, for production purposes, "non-necessary." Of course, it is inevitably difficult

to strike a balance between attracting the right workforce and pushing away "non-needed" residents.

The portfolio of professions offers a comprehensive view of Norilsk's social fabric. Of the city's 178,000 inhabitants, 50 percent, or about 90,000 people, are in the workforce—a lower share than in previous years, but nevertheless a share that is high compared to other Arctic cities, which host greater non-working-age populations. Of these 90,000, about 32,000 people—one-third—work in the mineral extraction sector (Norilsk Nickel employs two-thirds of these workers and its subsidiary companies the other third; City of Norilsk 2018a). In addition, many businesses depend on the firm, among them construction, transportation, and storage, which together employ a further 15,000 people, or almost 17 percent of the city's workforce. The rest of the workforce is divided between the private sector linked to consumption—retail, leisure, and so on (23,079 people, or 25 percent)—and public administration (19,846, or 22 percent). These numbers confirm that Norilsk is a much more diversified city than the cliché of an industrial monocity might suggest; it has developed consumer and public services sectors. But in terms of the share of adults with a postsecondary education, the city scores toward the low end of the Russian average, 65 percent.

Since post-Soviet privatization, Norilsk Nickel has gradually been shrinking its workforce. The number it employs plummeted from 140,000 during the Soviet period to 122,000 in 1996, 84,000 in 2001, and 56,000 in 2014 (Norilsk Nickel 2014), before rising slightly to 78,000 in 2017 (Norilsk Nickel 2018c). However, these numbers do not tell the whole story: the firm has been outsourcing many of its activities to semiprivate subbranches that are not considered part of Norilsk Nickel but still work entirely for it. This outsourcing has allowed the firm to limit the number of workers to whom it must give social benefits (author's interviews with representatives of Norilsk Nickel in Norilsk in July 2015, and in Nikel in July 2016). The firm has also cut several entitlement programs inherited from the Soviet system (pensions, health care, public transportation, and other services), shifting those costs to the municipality.

At the same time, the firm still needs to attract qualified engineers, a difficult task given that it offers an average salary for such professions (about $1,800/month for a miner or around $2,000/month for an engineer in 2015, according to informal discussions with miners and engineers in Norilsk in July 2013 and July 2015) and that many prefer the better living conditions elsewhere in Russia. As such, Norilsk Nickel has had to develop a strategy for recruiting engineers

from abroad, mostly in Ukraine and Kazakhstan. It has also tried to attract Russian citizens by building and fully furnishing apartment complexes in Norilsk and offering generous cofunding policies for apartments in another region of Russia for those who have worked for the firm for at least ten years (author's interviews with representatives of Norilsk Nickel in Norilsk in July 2015, and in Nikel in July 2016).

Pushing away those who are no longer needed is even more complex. Norilsk's social fabric is largely shaped by its working identity: one lives in Norilsk to work. The city thus has a relatively young population, with an average age of 33, compared to the Russian average of 39.7 (City of Norilsk 2016). According to the city's own data, an impressive 69 percent of inhabitants are of working age (18 to 60), with 24 percent younger and only 9 percent older (City of Norilsk 2017b). Moreover, two-thirds of those who are officially retired continue to work, performing small jobs for which the city would otherwise have to recruit migrants. There is only 5 percent unemployment, Russia's average.

Toward the end of the 1990s, Norilsk Nickel undertook some unsuccessful large-scale resettlement programs to reduce the city's population (Glazunov 2010; Parente 2012). From 2002 to 2009, and with the assistance of the World Bank, it tried out a federal voluntary relocation program in three pilot areas (Nuykina 2011). Between 2011 and 2015 the company invested $128 million in resettlement programs with the goal of sending "populations from Norilsk and Dudinka towards regions in the Federation which have more suitable living and climatic conditions" (Norilsk Nickel 2015). The company transfers funds to the Krasnoyarsk Kray, which purchases apartments in other regions in Russia for the resettled families. More than 11,000 persons were expected to be transferred under the program in 2015, yet only about 5,000 of them benefited from the project between 2011 and 2015. The firm has also invested modest sums (less than $100,000 in 2015) in charity, scholarships for local youth and Indigenous populations, and environmental programs in partnership with local associations (Norilsk Nickel 2015).

Yet all these efforts on the part of a firm cannot alter residents' feeling of belonging to their city. Other resettlement projects—such as the Northern Restructuring Project launched by the Russian government with the help of the World Bank, which aimed to assist the voluntary resettlement of Vorkuta's, Norilsk's, and Magadan's nonworking-age population to more southerly towns—have faced limited success. Emotional attachment to place remains an important identity marker

for individuals, and the romantic feeling of having built socialism in harsh climatic conditions on a pioneering front may hamper mobility: It is not easy to reconstruct place-specific social capital and many people have refused to leave the region where they have built their lives, despite the deterioration in living conditions (see Bolotova and Stammler 2010). Moreover, many of those who have been resettled have experienced difficulties in adapting (Heleniak 2009). In Norilsk, where the feeling of embodying the last frontier was strong during the Soviet era, local patriotism and pride remain an element that pushes some people to refuse to leave.

Today, the city seems to have stabilized demographically, both in terms of natural growth and in terms of in- and out-migration (City of Norilsk 2018a). Table 3.2 shows that the departures and arrivals almost result in population equilibrium. The facts that those leaving the city now do so largely through established mechanisms rather than uncontrolled flight, as occurred in the 1990s, and that workforce shrinkage is now planned and controlled by Norilsk Nickel suggest that the city has achieved some degree of sustainability, in the sense of maintaining control over the fate of the city and preparing for its population decline. On the third criterion for sustainability—improving the well-being of the population—however, the city has achieved only moderate results.

Improving the Well-Being of the Population

Health, Housing, and Crime Indicators

On the health-care front, the city does not rank very well. Life expectancy stood at seventy years for both sexes in 2015—which is Russia's average—with an impressive eleven-year gap between men, who die earlier, and women, who die later (Trubetzkoy 2018). Yet the real number is difficult to assess because many people leave before retirement age and therefore will pass away in another region of Russia. The health-care system remains weak in terms of the number of in-patient hospital beds and the number of physicians: It is below Russia's main Arctic cities but on a par with Yamal's gas monocities for beds, and lower than them for physicians. The municipal authorities and Norilsk Nickel have been working to address these issues by providing financial and professional incentives for medical specialists to settle in town, which has improved the situation in recent years (author's interviews with representatives of Norilsk Nickel in Norilsk in July 2015, and in Nikel in July 2016).

Table 3.2 | *Migration flows in Norilsk, 2010–15*

Year	Arrivals, number				Departures, number				Net migration
	Total	International	From another region of Russia	From another place in this region	Total	International	To another region of Russia	To another place in this region	Total
2010	10,987	1,680	8,164	9,844	12,198	231	10,235	1,732	–1,211
2011	11,008	1,520	8,261	9,781	13,872	374	11,532	1,966	–2,864
2012	12,056	1,822	9,222	11,044	14,094	332	11,641	2,121	–2,038
2013	12,586	1,799	9,416	11,215	13,126	504	10,766	1,856	–540
2014	12,469	1,668	9,385	11,053	13,405	549	10,936	1,920	–936
2015	13,395	1,929	10,220	12,149	13,233	648	10,762	1,823	162

Source: City of Norilsk 2018a.

Norilsk's average infant mortality (5.9 per 1,000) constitutes a good indicator of the state of health-care institutions and basic hygiene—drinkable water, protection against widespread basic infections, vaccinations, and so on. Yet it does not provide any insight into the general health of the population, especially the impact of living in a highly polluted environment. For that, one would need to add new data points such as the prevalence of chronic diseases. In 2015, for instance, heavy metal, dioxide, and sulfur waste were still between eight and forty-four times higher than existing standards permit ("Russian Ministry Demands" 2015). The city has a high rate of cancers and diseases of the lungs, blood, and skin. There were, for instance, 497/1,000 incidence of respiratory illness in Norilsk in 2012 compared to 379/1,000 for Russia as a whole, and 38/1,000 incidence of circulatory illness compared to 17/1,000 nationally (Goskomstat 2017e: 30; Kurkatov, Tikhonova, and Ivanova 2015). The long-term impact of pollution, however, is difficult to gauge, because many workers leave Norilsk for warmer climes when they reach retirement age.

There is only one traditional domain in which Norilsk finds itself better equipped: the number of nursing and midwifery personnel per 100,000 population, which is higher than in many Russian Arctic cities and even higher than in Novy Urengoy and Noyabrsk. This can be explained by the still lively Soviet legacy of improving motherhood and early infancy, and the municipal authorities' desire to present Norilsk as a child-friendly city. Krasnoyarsk Kray's motherhood capital (*matkapital*) is 137,000 rubles (about $2,000), which is about average for Russia, but the region provides it to families upon the birth of the second child and all subsequent children, like the federal award, whereas almost all other regions provide it only on the third child (Materinskii Kapital n.d.). Linked to the relatively young workforce, the number of young children in Norilsk is also relatively high, with children ages birth to five years comprising 9.1 percent of the city's population whereas they make up only 7.7 percent for the Russian population as a whole. More globally, children ages birth to thirteen years represent 20 percent of Norilsk residents, but only 16 percent of the country (Goskomstat 2018a).

In terms of space, housing conditions in Norilsk are average for Russia, with 24 square meters (m^2)/person. This says nothing, however, about the quality of that housing: a large part of the urban fabric is deteriorated due to low-quality construction and the difficulties associated with the changing temperature of the permafrost that lies below the buildings. In several neighborhoods, infrastructure degradation has been such that tens of multistory buildings have had to be

evacuated and demolished (Grebenets, Streletskiy, and Shiklomanov 2012). Around 10 percent of buildings are identified as having progressive deformations (Kronik 2001). The majority of housing offers a low level of energy efficiency, compensated for by overheating, and some buildings have water-related problems. At the same time, Norilsk spends five times more of its municipal budget than Yakutsk and twelve times more than Murmansk on transport and infrastructure management and repair to keep its roads, water pipes, and heating systems functioning during the long, cold winter. Other ISO indicators, such as the percentage of people living in affordable housing and the prevalence of homelessness, do not appear in Russian statistics.

Norilsk spends four to five times more on law enforcement agencies and national security issues than cities such as Murmansk or Yakutsk, a sign of its strategic status and the heavy control that reigns there. This security focus is largely appreciated by the population, which perceives it as guaranteeing a low level of petty criminality. Yet the numbers do not support the link between higher spending on law enforcement agencies and lower criminality. In terms of property crime, Norilsk has the highest rate of all Russia's Arctic cities; it is also on the high end of average for violent crime. Only on juvenile criminality, which is said to have halved since 2016, does the city score well (City of Norilsk 2017b). The city's suicide rate is average for an Arctic city: It is higher than in the Kola Peninsula but lower than in more-depressed cities such as Vorkuta and Magadan. Interestingly, alcohol abuse is quite low, as it is in all extraction cities compared to more economically diversified Arctic cities. In Norilsk this can be explained by the heavy control exercised by Norilsk Nickel and other extraction firms over their employees, who are subjected to breathalyzer tests every morning before being authorized to work.

Cultural and Socioeconomic Indicators

In terms of socioeconomic and cultural indicators, Norilsk finds itself in an average ranking between more-depressed extraction monocities—Vorkuta, Apatity, Monchegorsk, and Nickel, as well as Dudinka, which is not yet a monocity—and more developed and diversified cities such as Murmansk, Arkhangelsk, and Yakutsk and better-equipped new oil and gas extraction cities such as Noyabrsk and Novy Urengoy (Goskomstat 2017a, 2017b, 2017c).

The city scores poorly in terms of educational institutions. It does not have enough kindergartens (43 in 2017, or one per 4,140 people, compared to Russia's average of one per 3,021) or primary

and secondary schools (37 in 2017, or one per 4,811 people, compared to the Russian average of one per 3,434, in 2015; Goskomstat 2018b). The city's five colleges offer both traditional specializations (pedagogy, medicine, arts) and professions linked to the city's own identity (an industrial technologies and services college). For higher education, the most famous institutions are the Norilsk State Institute of Industry, which provides professional training for the careers available at Norilsk Nickel, and several subbranches of technical universities based in Moscow or Saint Petersburg.

The amount of space available for public gatherings is below average for a Russian city. If public squares are excluded, the city has only four small parks, five cultural institutions (one theater, two cinemas, and two museums, one of local history and one of arts), six sports facilities, one municipal library (with nine branch locations), and one big commercial mall. Only in the sector of sport facilities does Norilsk score well, on a par with Noyabrsk and Novy Urengoy: Extraction cities traditionally invest more in sport than in culture. As noted by Nadezhda Zamyatina, compared to Russia's other Arctic cities, Norilsk has a low level of grocery stores and malls, fewer museums and theaters, and fewer cultural professionals per capita (Zamyatina 2007). This data could be refined by collecting figures on the number of commercially oriented leisure places—cafés, restaurants, nightclubs, spa salons, and so on—to provide a better overview of the spectrum of services available to the population: with a registered 101 restaurants and cafés, the city scores relatively high, but less well than Yakutsk or Novy Urengoy (Zamyatina 2007).

Turning to the number of nonprofit organizations registered by the Ministry of Justice at the city level, the picture looks quite negative: Norilsk has only 213 nonprofits compared to 569 in Murmansk and 753 in Yakutsk (Ministry of Justice 2018). This data illustrates well the limited civil society sector in Norilsk compared to the dynamism of urban entrepreneurialism in Yakutsk and to a lesser extent in Murmansk. The more diversified a city's economic outlook becomes, the more diversified and dynamic is its social fabric, leaving more room for private initiatives, be they economic or social. Norilsk is also quite low in terms of Internet penetration, with 67 percent of inhabitants connected in 2017. Given its extremely remote location, it was one of the last big cities in Russia to get satellite Internet, at an average of one gigabyte/second. It was only in the second half of 2017 that a 956-km fiber-optic line running from Novy Urengoy reached Norilsk, thanks to a 2.5 billion ruble investment by Norilsk Nickel. Full-speed Internet was available citywide by mid-2018 (Ibragimov

2017). Yet it remains to be seen to what extent this will accelerate Internet penetration at the household level.

A similar trend appears when one explores the number of small and medium enterprises. Norilsk ranks quite low, as do all extraction cities. It has, for instance, only a third of the microbusinesses of Murmansk or Yakutsk (5,000 compared to 15,000 for Murmansk and 18,000 for Yakutsk) and fewer small businesses (164 compared to 660 and 519, respectively; Federal Tax Service 2018). This data should, of course, be taken with some caution, as it does not capture the shadow economy. Fieldwork observations confirm that Norilsk is much more entrepreneurial than the official number suggests, but this entrepreneurship is often informal (author's fieldwork and interviews with local entrepreneurs from ethnic minorities, in Norilsk in July 2013 and July 2015). That said, the difference between the three cities is striking. In terms of per capita spending to develop and support small and medium entrepreneurship, Yakutsk spent 252 rubles, Norilsk 39 rubles and Murmansk 17 rubles in 2012 (Goskomstat n.d.; "Raskhody na razvitie" 2012). No more-recent data are available.

Many of the ISO indicators that help calculate quality of life cannot be applied in the Arctic context (kilometers of bicycle paths or urban agricultural areas, e.g.) or else have to take into account the Russian context (e.g., the number of people using personal cars cannot be compared with the broad use of cars in the United States).

Political Indicators

Norilsk also finds itself at the bottom of the Fate Control Index—making its own decisions and having the ability to implement them—developed by Andrei Petrov (see chapter 6 in this volume) for twelve Arctic cities. Yet the concept is probably too normative—that is, too Western-centric—and is based on selected data that does not take into consideration some subtle adjustments between the stakeholders of different urban regimes (Laruelle in press). It is tricky to measure political life in contemporary Russia, since the country is a so-called managed democracy, or in other words, a partly authoritarian system. Moreover, comparing circumpolar politics is difficult given the diversity of political situations, among which Russia finds itself at the bottom in terms of classical democracy.

Yet this does not mean that there is no value in trying to capture urban political life. Direct elections at the Taimyr District level were abolished in 2007; Norilsk itself no longer elects a mayor and is run by a hired city manager. Norilsk's new head of the city's council,

nominated in 2017, is Rinat V. Akhmechin, a Tatar who has worked in several Norilsk Nickel companies and subsidiaries (City of Norilsk 2018d). The fact that the head of the city council comes from the industrial realm typifies the company town identity of Norilsk. Yet contrary to what one might expect, the city has—or at least had—its own political culture, with developed protest sentiments—probably a legacy of the industrial workers' world. Notwithstanding its noted extremely low turnout, in 2003 the residents elected rebellious trade union leader Valerii Melnikov as the city mayor—despite the local administration's efforts to disqualify him. Melnikov successfully advocated for Norilsk Nickel to spend more on the city's welfare. In 2007 Melnikov won a seat in the lower chamber of the national parliament on the pro-Kremlin United Russia ticket, but died of a heart attack in 2008.

The regional democracy index developed by Nikolai Petrov, first at the Moscow Carnegie Center and then at the National Research University Higher School of Economics, put Taimyr District in the middle of the list in terms of democracy ratings. Since elections are presumed to be rigged, the region is infamous for its extremely low turnout on election days. All the same, in the regional democracy index, the city ranked "more democratic than Taimyr and almost as democratic as Krasnoyarsk Kray as a whole, despite being a closed company town" (Petrov 2016: 23). In the most recent municipal elections, in 2017, voter participation dropped to 16 percent of eligible voters (Krasnoiarsk Vybory 2017)—a figure among the lowest in the Russian Arctic, on a par with Arkhangelsk, Severodvinsk, Dudinka, and Onega. Although it would, for the reasons given above, be difficult to develop a scale capable of capturing levels of local democracy across the circumpolar region, a scale for Russian cities alone would offer valuable insight into one important aspect of sustainability. Data on strikes or street protests could complement this analysis.

Social Inclusion Indicators

The ISO index does not cover all aspects of social inclusion, but it does include the main ones, such as gender balance and number of migrants. In terms of gender parity, the Soviet legacy means that women have largely been brought into the workforce: Women represent 48.3 percent of the workers in Norilsk, a good number for a city based on extraction professions usually considered masculine. As in many other developed countries worldwide, including the United States and some countries in Europe, women's salaries are about

one-third less than men's, a number that should be refined to see whether these salary differences are for performing the same job or for performing other jobs that are deemed less prestigious and are therefore less well-paid. As in many other countries worldwide, women in Norilsk dominate professions such as health care and education—state-funded jobs that are usually low paid.

At the political level, Russia lags far behind the most advanced countries—such as the Nordic states—in terms of gender parity but is more or less on a par with the European countries of the Mediterranean Basin. With only eight women on its thirty-four-member city council (23 percent), Norilsk finds itself on the lower end of Russia's Arctic cities in terms of political gender parity, along with Magadan, Monchegorsk, Kirovsk, and Novy Urengoy. This data could be refined by looking at the sectors in which Norilsk female politicians work to see if they are confined to conventionally feminine fields—education, family affairs, health care—or if they are also represented in the security and industry sectors. It would also be interesting to look at gender parity at the highest echelons of Norilsk Nickel and explore the firm's strategy of offering jobs to the wives of the engineers that the city recruits, in order to keep the couple in the city and reduce turnover among the qualified workforce. Other aspects of social inclusion remain understudied, including support for people with disabilities.

Social inclusion also relates to the arrival of foreign migrants and their integration into the urban fabric. There is a circumpolar trend of Arctic cities becoming increasingly multicultural (Laruelle 2019). This is the case with Norilsk, which hosts an important community (about 15 percent of the city's population) of migrants or former migrants from Azerbaijan, Central Asia, and the North Caucasus who have settled in the city and become Russian citizens.[2] In 2016 the city officially counted only 1,660 immigrant permanent residents, as well as 1,265 foreign citizens with temporary residency; this is a low number that hides some undocumented flows. The Ministry of Interior noted a slight rise in the number of foreign migrants in the city in 2017 (2.1 percent over 2016; City of Norilsk 2017b).

Migrants' associations are recognized as part of the local social fabric. Although the House of Friendship (Dom druzhby)—the name given in Russia to institutions hosting associations of all nationalities—closed in 2012 ("Ulitsa laureatov" 2013), members of different nationalities can exhibit their folklore and know-how annually during the July holiday celebrating the anniversary of the city. A mosque, considered to be the northernmost one in the world, was erected in 1998 and now hosts a large and diversified Muslim community comprised

of Tatars, Bashkirs, Dagestanis, and Chechens, as well as Azerbaijanis and Central Asians (Laruelle and Hohmann 2019). Migrants occupy important niches in the city's economy and are visible on its urban landscape, working in fruit and vegetable kiosks, supermarket chains, cafés, and restaurants, as well as selling second-hand items in the market. Yet the majority of them live in the most degraded neighborhood of the city, in the old Komsomol apartment buildings (*gostinnaya*), often in single rooms and—since they are downwind from the factory—under poor environmental conditions.

Conclusion

In studying the case of Norilsk, one issue that emerges is that of the time scale for sustainability. Some structural variables are slow to change; others, such as in- and out-migration flows, can evolve dramatically in a short period of time. In many respects Norilsk has limited fate control, dependent as it is on external conditions such as world mineral prices and international environmental policies. The main dilemma is that, the more Norilsk Nickel is pressured to improve its environmental footprint, the less economically viable extraction becomes, and the more likely it therefore is that the company will decide to close its factories, which would push the city into a dramatic situation. Today's Russian regime is not the Soviet Union: It is not authoritarian enough to organize a mass relocation of citizens once a city collapses economically and cannot prevent people from staying there if they want to do so. The experience of the early 2000s showed that it was not easy to resettle entire villages, let alone towns. The government will thus continue to pressure Norilsk Nickel to maintain economic activities in Norilsk and therefore to pay for the city's everyday life, even if this is progressively less and less profitable and conditions deteriorate. The more the city shrinks, the more the municipality will have to come up with creative solutions for abandoning some urban spaces, concentrating urban life around its downtown center and moving it toward a logic of intensity rather than of extensiveness.

ISO indicators provide a good overview of the state of a city, but do not capture its dynamics. They do not consider any legacies, such as that, given the remoteness of Norilsk, it is almost impossible for today's stakeholders to remove industrial and construction waste, which is mostly concrete and metal, whose destiny is to remain in place and gradually collapse. Even more importantly, they do not take

into consideration the presence or absence of efforts by the city's actors to improve sustainability, even though this is a critical component of the city's progress toward sustainability—or lack thereof. Only recently, due to international financial pressure, has Norilsk Nickel begun to tackle its environmental footprint. The municipal authorities have slowly begun to think about improving the livability of the city for its residents. It remains to be seen what gains they can make in terms of residents' well-being.

In theory, they can improve health and housing conditions, as well as quality of life, food security and safety, and cultural activities, since most of these gains require financial investment. They will face more difficulties in terms of citizen participation, attracting small and medium-sized enterprises, and engaging youth, since doing so would require changing the city's political culture. The case of Norilsk therefore reveals at least five fields that need new indicators to complement the existing ISO ones: 1. stakeholders' willingness to improve sustainability and policies for doing so; 2. the feeling of belonging to a place, which may hamper strategies aimed at moving populations away once the resources under exploitation are depleted; 3. the "civil society" fabric and multinational character of the city; 4. the remoteness of the city and its transport accessibility (specific to the Arctic region); and 5. the cost of the consumer goods basket relative to the average salary.

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Notes

1. See the Norilsk special issue of *Polar Geography* 40 (4) (2017).
2. North Caucasians are Russian citizens so not legally migrants, but they are included here due to their perceived social and cultural foreignness.

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CHAPTER 4

Yakutsk

Culture for Sustainability

Vera Kuklina with Natalia Shishigina

Introduction

The United Nations Educational, Scientific and Cultural Organization (UNESCO) recognizes culture as both an "enabler and a driver of the economic, social and environmental dimensions of sustainable development" (UNESCO 2016: 19).[1] While this report does not give a concise definition of the word "culture" and almost every team of researchers of culture bring their own meaning in how they understand it, we find the instrumental definition of culture given by Adger et al. (2013) to be the most useful: "The symbols that express meaning, including beliefs, rituals, art and stories that create collective outlooks and behaviours, and from which strategies to respond to problems are devised and implemented" (Adger et al. 2013: 112). In order to provide a concise understanding of cultural sustainability, in this chapter we will focus on those aspects of culture that contribute to urban sustainability or that serve as indicators of its absence.

Perhaps the most notorious examples of those aspects are the ideas of the creative class (Florida 2003) and the cultural economy (Zukin 1995). More-explicit links between urban sustainability and culture have been developed in recent decades. For example, some researchers studying sustainability issues see urbanization as a threat to the local culture and heritage (Nadarajah and Yamamoto 2006). Within the series "Routledge Studies in Cultures and Sustainable Development," culture is understood broadly, "from art-based

definitions to way-of-life based approaches . . . not only as an additional component of sustainable development—as a 'fourth pillar'—but rather as a mediator, a cross-cutting transversal framework, or even as a new set of guiding principles for sustainable development research, policies, and practices" (Hristova, Šešić, and Duxbury 2015: xi). One of the books in this series is dedicated to studies of culture and sustainability in small and medium-sized cities in Europe (Hristova, Šešić, and Duxbury 2015). The authors call for policies that prioritize an inclusive cultural life that would consider such marginalized groups as refugees, and homeless people not only as consumers but also as cultural actors (Matarasso 2015). In the field of policymaking, the mayors and representatives of European cities and towns in the Basque Declaration (2016: 4) stated, "In order to support and accelerate the Socio-Cultural Transformation: We will develop a 'culture of sustainability' based on equal access to municipal services for all citizens regardless of their age, religious affiliation, ethnic identity or gender, and reflect this particularly in our budgeting and educational systems." In particular, the Basque municipalities use the phrase "percentage of the inhabitants who are Basque-speaking" among the indicators to ensure inclusive and quality education for all and promote lifelong learning (Basque Country 2018: 65). We find this call especially relevant for the studies of Arctic urban sustainability where some cities undergo increasing urbanization of local, predominantly Indigenous, people with rural origins as well as growing numbers of migrants with different regional, ethnic, and religious backgrounds.

In the Arctic, however, we find additional dimensions for integrating culture into the sustainability agenda. In particular, in the recent analysis of the studies of culture and sustainability in the Arctic, two different directions are distinguished: "'Sustainable cultures,' focusing on the prospects of cultural viability in Arctic contexts; and 'cultural sustainability,' which explores the role of culture(s) in broader sustainability contexts" (Gartler, Kuklina, and Schweitzer 2020). While the authors raise more questions than they answer about relations between the terms "culture" and "sustainability," the urban context further complicates the discussion. The only indisputable categories are the three major features of well-being listed by the *Arctic Human Development Report* (AHDR) that distinguish the Arctic from other countries: cultural vitality, fate control, and contact with nature (Einarsson et al2004). Specifically, the report focused on language and language vitality, spirituality and worldview, and the arts and sports that were related to Indigenous peoples and mostly to the rural areas that practice traditional land use and maintain

nomadic and seminomadic practices. For instance, Indigenous people have been recognized as the traditional ecological knowledge holders and experts of climate change and its effects on local landscapes (Adamson, Hannaford, and Rohland 2018).

Researchers have described how the sedentary lifestyle of settled village life erodes the transmission of Indigenous knowledge, which requires "living on the land for migratory peoples (Ohmagari and Berkes 1997), and reduces their flexibility (Huntington and Fox 2005). An urban life is expected to interfere even more directly with Indigenous knowledge preservation. As Balzer (2013) has pointed out, local Indigenous peoples' traditional way of life conflicts with urban practices. However, the authors of the Arctic Social Indicators suggest the rate of publications in the Indigenous language as an indicator of cultural well-being, arguing that the availability of forms of popular culture that use the Indigenous language is an indicator of cultural vitality in the urban context (Larsen and Schweitzer 2010). The same could be applied to spirituality, arts, and sports in the city. In particular, Balzer considered the revival of shamanic practices in the city as a more convenient form of cultural revival than could be practiced in rural areas (Balzer 2011).

Another perspective on the urban lifestyles of Indigenous people is related to the additional resources available for a vibrant culture (Kishigami and Lee 2008). However, the city is not always helpful in this regard. Patrick and Tomiak (2008) examined the Inuit in Ottawa and argued that urban Indigenous peoples have limited opportunities to travel back home due to difficult transportation logistics and that their knowledge of Indigenous languages is rarely an asset in the job market, so preservation of their languages and cultures within the urban community is extremely challenging. If for the reproduction of traditional cultures in rural areas it is enough to use informal ways of transmitting the native language, in cities, on the contrary, the institutionalization of knowledge and ethnocultural values in standardized educational programs becomes decisive. Exploring the use of Vepsian language in Karelia, Laura Siragusa (2017) differentiates its role in the village and in the city. In the urban areas that language can serve as a political tool to gain visibility, as a symbol of group identity, and even as a secret code. We can add that the use of the Indigenous languages would support improved understandings of the local environment in the cities, despite their extensive infrastructural development.

The framework for quantifying culture derives from the standards of ISO 37120 (Sustainable cities and communities—Indicators for city services and quality of life) published by the International Organization

for Standardization (ISO) in 2018. In the first edition of 2014 this indicator did not exist (ISO, 2018). According to ISO framework, sport and culture are measured together. The core indicator is the number of cultural institutions and sports facilities per one hundred thousand population. Cultural institutions include museums, art galleries, live performance centers, libraries, botanical societies, historical societies, and community cultural centers. The supporting indicators include the percentage of the municipal budget allocated to cultural and sports facilities and the annual number of cultural events per one hundred thousand population. However, the main reference for the choice of these indicators is the "2009 UNESCO Framework for Cultural Statistics" (UNESCO 2009), which places a greater emphasis on economic than on environmental issues of sustainability. While recognizing the importance of these indicators, we call for attention to a more holistic view of culture in the Indigenous cultures where education, language preservation, subsistence activities, and environmental problems are closely interrelated. We argue that sustainability is based on an appreciation of intimate relationships among humans and the local environment that evolved within Indigenous cultures but that, in the urban setting, these relationships have been mediated by infrastructural development. These cultures can be quantified in some ways, but have to be considered in specific national, regional, and local contexts for comparisons across different cities and countries. In particular, we focus on four aspects of culture: cultural institutions, cultural diversity, contact with nature, and cultural economy. We make our broader points about culture for urban sustainability by examining a case study of Yakutsk.

Studying Culture for Sustainability in Yakutsk

The Republic of Sakha in general and its capital city Yakutsk in particular have often been the center of attention for Arctic scholars. Local scholars actively engage in scientific discussions about the Arctic. The Siberian branch of the Russian Academy of Sciences has nine local divisions. The Sakha Academy of Sciences has six research centers and two departments. The Institute for Humanities Research and Indigenous Studies of the North, part of the Siberian branch of the Russian Academy of Sciences, conducts studies on local cultural heritage and provides assessments of federal and regional laws addressing issues related to the Indigenous peoples. Its senior researchers, F. S. Donskoi, V. A. Robbek, and R. I. Donskoi, were the

lead authors of the development concept for the "Small-Numbered Indigenous Peoples of the North in the Twenty-First Century" (1999) and development concept of the "Small-Numbered Indigenous Peoples of the North, Siberia and Far North in the First Quarter of the Twenty-First Century" (2001) (as discussed in Donskoi, Robbek, and Sheikin. 2003).[2] In a more recent study, Tomaska (2017) examined rural migrants to the cities and noted the willingness of parents to integrate their children into urban societies and to provide them with better educational opportunities, a process that is also sometimes accompanied by the adoption of a different, dominant culture. Local sociologists also note that, among small-numbered Indigenous people moving to the cities, there are more women than men, creating a gender imbalance (Donskoi 2001; D. M. Vinokurova 2013; U. A. Vinokurova 1992).

The Research Center for Circumpolar Civilizations, part of the Arctic State Institute of Culture and Art in Yakutsk, is active in studies of the sustainable development of cultures of Russian Federation peoples living within the permafrost zone (Kul'tura i iskusstvo Arktiki 2017; Marfusalova 2002; Robbek 2000; U. A. Vinokurova 2015). Different features of circumpolar civilization, including subsistence cultures, identities, cultural policy, spatial images, environmental ethics, arts, and cultural landscapes were gathered in the book *Kul'tura Arktiki (Arctic Culture)* (Ignat'eva et al. 2014). Uliana Vinokurova's theory of Arctic circumpolar civilization identifies creativeness and beauty as the main sources of sustainable development (U. A. Vinokurova 2017).

In their case study of Sakha, Fondahl, Crate, and Filippova (2014) noted major problems in monitoring language retention: Statistics are not gathered on the settlement and even *ulus* (county) levels, and all the languages of the local Indigenous peoples are listed in the *Interactive Atlas of the World's Languages in Danger* (UNESCO n.d.). If we use only this indicator, we can miss other, more-positive, trends of cultural vitality. As for the urban/rural dimensions of social indicators, they noted, urban Evenks and Dolgans reported more use of their own language than the rural population, presumably "due to political positioning" (Fondahl et al. 2014: 76). Ferguson and Sidorova (2016) also noted the importance of language for the ethnic identity of the Sakha whereas religious beliefs have not been considered as important since most of the Sakha people converted to Christianity during the tsarist period.

We use secondary sources—censuses, statistics (from Rosstat unless other data sources are mentioned), municipal data, reports

of the institutes of higher education, and Internet sources—and the results from field studies conducted in Yakutsk during the summer of 2017 and spring of 2018. These included two focus groups with students from the Yakut language departments and with students of the Department of Northern Philology, participant observations, and interviews with sixteen experts, five migrants from remote villages, four young people graduated from the Institute of Languages and Cultures of Peoples of the North-East of the Russian Federation, two young graduates from the Arctic State Institute of Culture and Art, five students from the Department of Northern Philology, and three students from the Department of Yakut Language and Culture. The duration of the interview ranged from twenty to ninety minutes and averaged about forty to sixty minutes. To collect the interviews, we used the social networks of local researchers.[3]

Cultural Institutions

The territory on which Yakutsk is currently located has long been used by the seminomadic Indigenous people of Sakha (Yakuts) for seasonal migrations. Founded by Cossacks in 1632 as an outpost, Yakutsk served as a Cossack command center for the large area spreading across Eastern Siberia to the Far East. Currently, Yakutsk is the capital of Sakha Republic (Yakutia), the largest region in the Russian Federation. It boasts the most territory within the Arctic circle, although this land is among the least accessible in Russia. Experts estimate that 60 percent to 90 percent of the republic's territory does not have access to permanent ground transportation (Kuklina and Filippova 2019). Yakutsk is the only city where infant mortality, suicide, and outmigration have decreased within Sakha Republic (Fondahl et al. 2014). Moreover, it is one of the fastest growing cities in the Arctic: From 1990 to 2012 the city population grew by 45.2 percent (Kul'tura i iskusstvo Arktiki 2017).

In terms of cultural assets, the city has forty-eight cultural institutions, including libraries, cultural and leisure centers, cinemas, a park of culture and recreation, and music schools. The number of cultural institutions varies across the Arctic and depends on numerous factors (figure 4.1).

The average number of cultural institutions in Yakutsk does not reflect its ambitions to become the cultural capital of the Arctic (SakhaLife 2015). Resources for such expenses are limited by necessary expenditures required by the deteriorating living conditions

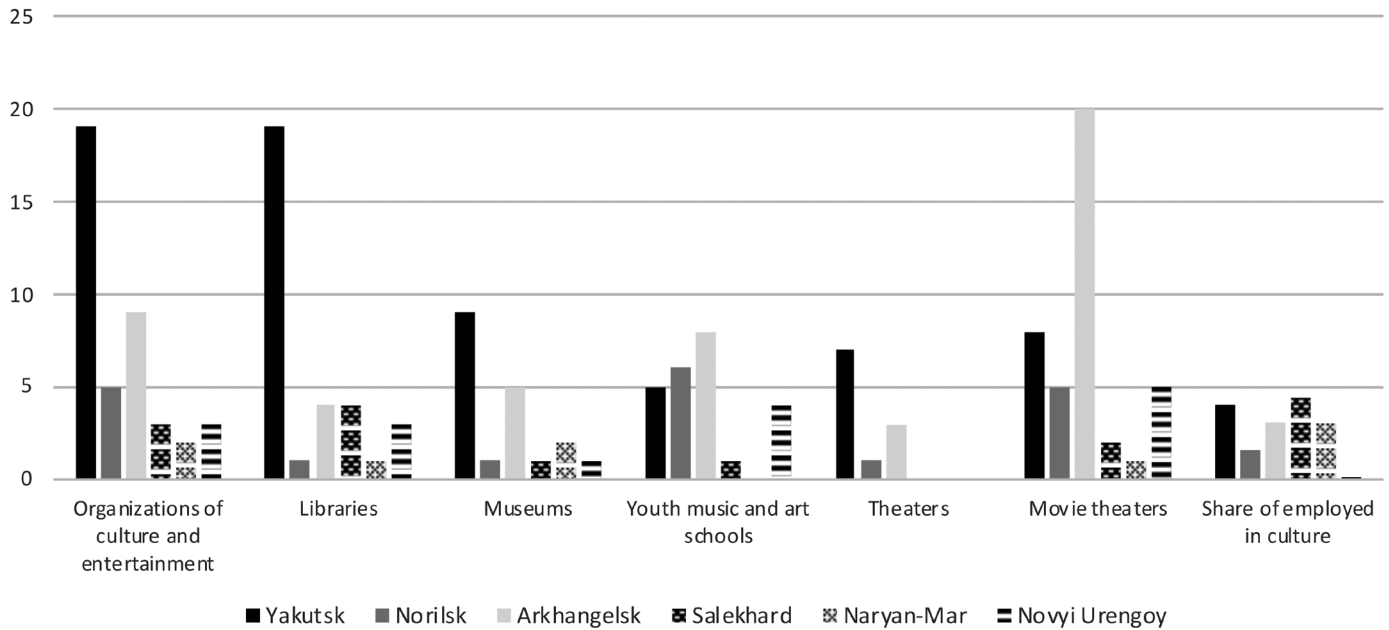

Figure 4.1 | *Cultural institutions per one hundred thousand population in selected Arctic cities.*
Source: Rosstat 2019.

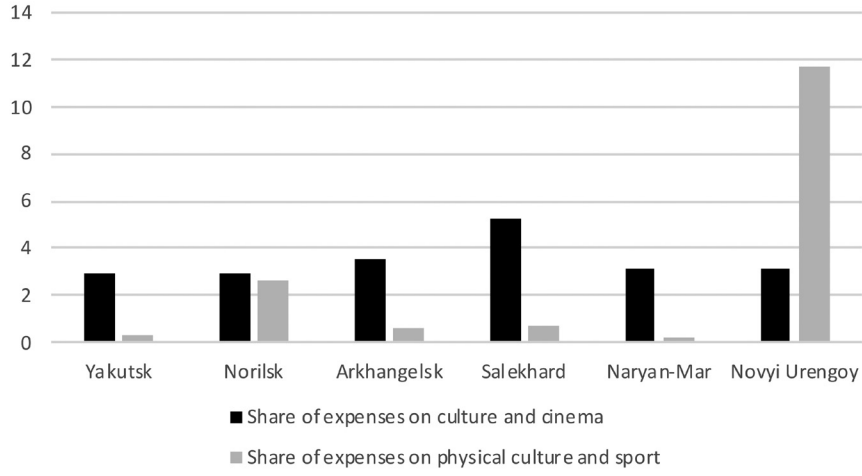

Figure 4.2 | *Percentage of municipal budget allocated to cultural and sports facilities.*
Source: Rosstat 2019.

in the villages that have led to an accelerating in-migration from rural areas or the environmental risks caused by the rapid growth of the city. Also, the amount of municipal budget allocated to cultural facilities would not reflect the real expenses on culture in the city because these are based not only on municipal, but also on regional and national budgets (figure 4.2). As one can see, the lowest shares are for Yakutsk and Arkhangelsk, which are both regional centers. On the other end, the high percentage of expenses allocated for sport in Novy Urengoy makes an observer suspicious about the real beneficiaries of the funds.

As the capital of the Russian region with the largest territory located above the Arctic circle, Yakutsk has developed a specific regional policy that emphasizes subsidies to increase transportation accessibility and expand the provision of food and supplies to the North, setting aside land for traditional uses, and the preservation and revitalization of Indigenous cultures. Republican status during the Soviet era made it possible to spend more on cultural development than in ordinary regions (oblasts). Beyond that, the region is rich in natural resources (diamonds, gold, oil, gas, rare metals, coal, and uranium). In the 1990s the republic directed taxes from diamond mining to the regional budget (Turovskiy 2015).

City authorities are responsible for the management of culture related to interethnic and interconfessional relations, library services,

entertainment and cultural services, cultural heritage, local arts and crafts, and recreational activities, including the creation of public spaces (Semeunov 2016). The city's department of cultural management oversees municipal cultural institutions, including museums, centers for culture and entertainment, libraries, theaters, parks of culture and recreation, the circus, and youth centers (arts, choreography, music). The main indicators the city uses to assess the state of culture include the number and kinds of cultural institutions, their material condition, the average monthly salary of their employees, and the share of expenses for the development of culture and film industry in the local budgets (Semeunov 2016). Indicators for the assessment of the annual activity of local theaters include the numbers of performances, debuts, spectators, and tours.

In 2015, the regional government formulated a Cultural Policy Concept which stated Sakha's goal to become the cultural center of the Arctic, and Yakutsk to be its cultural capital (Theater Olonkho 2015). The strategy is based on the existing experience of organizing international workshops and conferences and strong international connections. In particular, Yakutsk has hosted conferences on *khomus* (an Indigenous instrument often called the Jew's Harp in English) music (in 1991), shamanism (in 1992), oral epic literature (in 1994), and has plans to develop an innovative cluster "Olonkho Land" (Vittorio Grassi Architetto and Partners 2015). The local library system has established an international book exchange with major libraries in foreign countries, such as the National Library of France, the US Library of Congress, and others. The international Association of World Reindeer Herders and the Northern Forum (a group representing subnational or regional governments from throughout the North) offices are located in the city. The Children of Asia Games have been organized in Yakutsk every four years since 1996 and is considered a form of cultural revitalization (U. A. Vinokurova et al. 2017).

The wealth from extractive industries together with the movement for cultural revival, made possible investments for urban development and the creation of a number of cultural institutions in the city: the Sakha national TV and radio company (NVK Sakha), the Sakha film studio, the National Theater of Dance founded in 1992; the Higher School of Music founded in 1993; the Academy of Sciences of the Republic of Sakha founded in 1994; and the Arctic Institute of Culture and Arts founded in 2000.

The Khomus Museum is an example of the creation of a cultural institution with limited state support. The first collection was formed by Professor E. A. Alekseev, who gathered *khomuses* during

his research activities and founded the museum in 1990. Currently the collection has 1,342 instruments from various Russian regions and forty-five countries. One of the main contributors, the honorary president of the International Jew's Harp Society, Frederick Crane, donated his collection of 595 instruments to the museum (Shishigin 2013). Most donations were given without state support, while the city provided the space, facilities, and officially employed eleven staff members. The majority of visitors are local—2,977 of 3,665 in 2017, according to the Khomus Museum.

The epic of Olonkho, the Yakutian hero, is an example of the larger ambition of both local cultural elites and local authorities to actualize ethnic Yakut heritage on a global scale. The epic was recognized by UNESCO as a masterpiece of Intangible Cultural Heritage of Humanity in 2005 (ICH 2019). In 2010 the Olonkholand Foundation (with approximately forty cofounders, including representatives of the arts, culture, architects, and researchers) developed the project of the "Olonkho International Center" on land designated for that purpose in the southern outskirts of the city near Lake Saysary. To implement the plan, they invited several Western and Russian experts in this field, including John Howkins (the author of the book *The Creative Economy: How People Make Money from Ideas;* 2001) and Sergey Zhuravleuv (from the rating agency Expert-RA) (Yakovleva 2016). The Italian company Vittorio Grassi Architetto and Partners developed the master plan (Vittorio Grassi Architetto and Partners 2015). The effort has led to some criticism. Similarities of the epic with Central Asian cultures raises questions about how it fits the image of Yakutsk as an Arctic city. Additionally, the focus on Sakha culture also excludes other cultures, such as those of the small-numbered Indigenous peoples of the region and migrant communities.

Among state-supported cultural institutions dedicated to the development of the ethnic cultures of small-numbered Indigenous peoples of the North, one can recognize the state ensemble Savdie, the folkdance ensemble Gulun, the Museum of Music and Folklore of the Peoples of the North, and the Theater of Culture of the Peoples of the North.

Cultural Diversity

During the Soviet era there was a significant inflow of ethnic Slavic citizens from the western parts of the country who ultimately made up the majority in the city. With the breakup of the Soviet system,

as with many other Arctic cities, Yakutsk experienced a wave of out-migration among workers who did not have a local ethnic background (Heleniak 2009). About 35 percent of the Russian population left the city (Laruelle and Hohmann 2017). Moreover, young Yakuts with sufficient resources seek higher education beyond the republic, in Moscow, Saint Petersburg, or abroad. For example, one can find realty advertisements with offers in three capitals: Moscow, Saint Petersburg, and Yakutsk. However, the migration outflow is more than compensated for by in-migration from rural areas within the region and former Soviet republics. As U. A. Vinokurova (1992) has pointed out, Yakutsk is the only city in the republic that serves ethnic integration functions with its numerous cultural institutions. It adds to the attractiveness of the city among Yakuts and representatives of small-numbered Indigenous peoples. The most discussed and evident division lies between the former rural and long-term urban population. According to Sidorova and Khlinovskaya Rockhill (2016), people coming from villages are more likely to be marked by otherness and a lack of local knowledge related to norms, expectations, and rituals; and often have socially marginal status with lower education and income. Meanwhile, their knowledge of the natural environment has not been appreciated in the city.

In terms of the ethnic composition of Yakutsk, we can distinguish six groups: Yakut, Russian, small-numbered Indigenous, from other Russian regions (including Buryats, Tatars, Ingush), from the former USSR (including Ukrainians, Armenians, Kyrgyz, Uzbeks, Belarusians, Azerbaijanis) and foreigners from other countries (table 4.1). In order to represent the interests of these various ethnic groups, Yakutsk authorities have registered forty-three cultural entities—public organizations dedicated to preserving and promoting ethnic cultures, languages, customs, and traditions (Dom druzhby narodov 2017). Some of the ethnic groups are visible to the city's overall population because they occupy specific economic niches: Armenians dominate the construction sector, the car repair business, and the shoe mending sector; Uzbeks and Azerbaijanis lead the fruit and vegetable import market; and a prominent Korean family is well known for its local vegetable production. These groups also gain visibility by organizing ethnic associations, which are based at the official House of Friendship (Dom Druzhby), and by attending religious services at the Armenian church, various mosques, and the Buddhist temple (Laruelle and Hohmann 2017). In 1996 the public-private Academy of Spirituality (Akademia dukhovnosti) was founded in the city and included the leaders of its cultural, educational, research,

Table 4.1 | *Ethnic composition of Yakutsk*

Category	People	Percent
Total	295,664	100
Did not mark ethnicity	10,473	3.54
Marked ethnicity, among them:	285,191	96.46
Sakha (Yakuts)	140,272	47.44
Russians	113,624	38.43
Evenks	2,870	0.97
Evens (Lamuts)	2,176	0.74
Dolgans	189	0.06
Chukchi	59	0.02
Yukagirs	211	0.07
Small-numbered Indigenous people from other regions	67	0.02
Buryats	2,573	0.87
Tatars	2,071	0.70
Ingush	733	0.25
Ukrainians	3,935	1.33
Kyrgyz	3,004	1.02
Armenians	2,328	0.79
Uzbeks	1,952	0.66
Tajiks	1,860	0.63
Belarusians	627	0.21
Azerbaijanis	552	0.19
Koreans	847	0.29
Chinese	732	0.25
Other groups	4,509	1.53

Source: Census-2010, Federal Service of State Statistics for Sakha Republic. Retrieved 13 December 2019 from http://sakha.gks.ru.

and religious institutions (Akademia dukhovnosti 2019). In 2002, the center of Yakutsk spiritual culture Archy House began operations a short distance from the city center and focuses more on secular than religious activities (Yakovleva 2005). Its ethnic architectural design and interior now attracts tourists. In 2014 the Russian Ministry of Justice officially recognized the traditional shamanist Sakha beliefs Aar Ajyy as a religion and registered their followers as a religious organization (NewsYktRu 2015).

Questions of cultural diversity have been at the core of regional policy and social activities. In 1994–2002 those questions were handled by the Ministry and then by the Department of the Peoples of Sakha Republic (Yakutia) and Federal Relations. In 2016 governance of interethnic relations shifted to the new Ministry for the Development of the Institutes of Civil Society of the Republic of Sakha

(Yakutia). The ministry includes several offices and two departments: the Development of Civic Initiatives and Nationalities Affairs, and the Small-Numbered Indigenous Peoples of the North. According to the minister for Peoples Affairs and Federal Relations, between 1991 and 1997 more than seven hundred public organizations were registered in the Republic of Sakha, among them about a hundred who set their goals and tasks to address ethnic and cultural issues.

The multilingual landscape of the city is ensured by the regional law on the languages of the Republic of Sakha (Yakutia) (Ferguson and Sidorova 2016). However, as Robbek (1998) has pointed out, the republic has a distinctively complex language situation with numerous examples of bilingualism and polylingualism combined with significant language loss among the nonnumerous Indigenous peoples. In an extensive study of the use of the Yakut language in Yakutsk, Ivanova pointed to the use of information-communication technologies to help preserve the language as it competed with a variety of other languages (Ivanova 2017). She noted that those Yakuts who lived more than ten years in the city were less likely to choose only Yakut as a native language. Only 57 percent of Yakuts born in Yakutsk chose Yakut as a native language, while among Yakut rural migrants 100 percent of respondents chose Yakut as a native language. There are numerous efforts to promote Indigenous languages among the Yakut city residents.

Within the city the official buildings have signs in Russian and Sakha languages; the tourist signs also include English. The TV and radio programs of the NVK Sakha are transmitted in Sakha language with some programs in Even, Evenk, and Yukagir languages. The book agency Bichik and a number of regional newspapers publish in Sakha, Even, Evenk, and Yukagir languages. The regional library in Yakutsk stores a disproportionally higher share of books published in the languages of the small-numbered Indigenous people of Russia (1,956, or 17.7 percent), while the rest of those books are stored in twenty-five other Russian regions (Samsonova 2013). However, the number of titles available in these languages in the library is still quite meager: 294 books in Even language, 157 in Evenk language, 68 in Yukagir language, and 21 in Dolgan language. The common database of books in the twenty-five languages of the nonnumerous Indigenous people of Russia coordinated by the Russian national library accounts for just 3,525 titles. The book collection in Sakha language contains 57,889 books. Currently, there are several initiatives seeking to create online databases in Indigenous languages following the development of mobile phone apps for studies of Sakha and Evenki.

Language education is one of the most pressing issues among the local Yakut families. Of fifty schools in the city there are seven with Sakha as a language of instruction, including the prestigious Sakha urban national gymnasium; and twenty-two schools with Sakha language instruction, including Sakha-Canadian school #38 with classes in Evenk. At the preschool level, of fifty-nine organizations there are five with Sakha as a language of communication and thirty-two with groups that use Sakha as a language of communication (Plan kompleksnogo 2017). According to the municipal estimates, the demand for Sakha classes will increase in the near future and will reach 35 percent by 2025 (currently 24 percent of pupils study in Sakha language). The cultural and regional components of education are filled with classes on the history and cultures of Yakutia and its peoples. Despite the programs for teaching these classes, however, textbooks explaining the cultures of Indigenous people are not developed yet.

With the introduction of the Unified State Exam to increase the fairness of the college admissions process, many parents and high school teachers prioritize learning the Russian language over native alternatives, because even if the pupil would like to apply for a position studying the Yakut language, she must first pass the Unified State Exam in Russian. However, at the elementary and preschool levels parents we interviewed note the competitiveness of gaining admission to the Sakha classes where Sakha language is taught three hours a week. In ordinary elementary schools children take two hours of classes on Sakha language, two hours of Sakha literature, and one hour on cultures of the peoples of Yakutia. Classes on Yakut literature are taught up to the ninth grade. As one of their teachers complained,

> As the 4th grade is completed, they are already focused on the USE [Unified State Exam], and if there are classes on Yakut language or literature, then two more subjects are added. Parents do not want that. This is the third-year practice. The current 9th grade refused to take Yakut language class in grade 7. They have 4 hours of Russian language. If there were one hour of Yakut and one hour of literature, then it would be 3 hours of Russian, and they need to take the exam in Russian. We also have migrants in our school: Uzbeks, Kazakhs, Kyrgyz, Buryats—a multinational school, the district is exactly like that. But there are also problems there, for example, the Uzbeks cannot master the program, and in the 9th grade they return to their homeland. (Interview with a teacher of Yakut language, female, age 30, Yakutsk, 2018).

The specialists teaching native languages and cultures are trained in two pedagogical colleges and two institutes of higher education: the Institute of Languages and Cultures of Peoples of the North-East

of the Russian Federation in the North-Eastern Federal University and the Arctic State Institute of Culture and Art. The main mission of the first institute named is to train Indigenous language and culture teachers in educational institutions. The second institute named is more focused on the preservation and development of the centuries-old culture of the peoples of the Arctic and, on this basis, is focused on promoting new forms in the global educational and cultural space (Arctic State Institute of Culture and Arts, 2019). For those learning Yakut and Yukagir as second languages, special classes now offer instruction at the North-Eastern Federal University. Gradually, it is becoming the center of training for representatives of nonnumerous Indigenous peoples (Evenks, Evens, Chukchi, and Yukagirs) not only in the republic, but also across other Arctic regions, second only to the Herzen State Pedagogical University in Saint Petersburg. In addition, as part of the implementation of the State Order of the Ministry of Education and Science of the Sakha Republic (Yakutia), a series of multimedia textbooks native literature (called The Library of Literature) was created for middle schools with a native (non-Russian) language of instruction (Yezhegodnik 2016).

Contact with Nature

According to the Arctic Social Indicators studies, contact with nature is measured in consumption of traditional food (per capita intake of traditional food in kilograms) and harvest of traditional food (total weight of traditional food harvested in a given period (in kilograms) (Larsen and Schweitzer 2010). Although these indicators are not available on a city level, the orientation on rural communities is evident. Since most of the cultural heritage of Indigenous peoples is related to subsistence and symbolic land use, the main concerns of the local authorities are related to questions of how to incorporate traditional worldviews, images, and practices into the urban environment. At the same time, as a center for information resources and decision making, the city is a focal point for environmental activists and Indigenous leaders concerned with the problems of their homelands (Balzer 2013).

Rural migrants to the city often occupy housing that does not meet traditional urban standards. According to Yakutsk data, in 2007 the share of housing with central heating was 88.9 percent, and hot water was available for 70.8 percent of housing (Respublikanskaia tselevaia programma 2008). Currently, there are growing areas with wooden houses without access to standard urban utilities, especially

in the city's margins. For rural immigrants, such districts are a way to reduce the costs of housing and satisfy their desire to live on the land. The residents often build houses themselves or with the support of relatives and friends. In the yard, they can grow their own vegetables and build *lednik* (ice cellars to store food and fur). Living in the city outskirts provides easier access to traditional subsistence activities (hunting, fishing, and gathering), although it leads to overexploitation of the hunting grounds around the city (Gosudarstvennyi doklad 2015). An increasing number of individuals living in the suburbs threatens local water quality. While the city built new water treatment facilities, opening in 2006, the villages forming the city's suburbs do not have access to them.

At the same time the rural migrants want access to city services. The migrants themselves explained that Yakutsk attracted them by the contrast to the rural lifestyle, availability of utilities, services, and numerous opportunities not available back home in the village: "Everything is so easy, nothing needs to be done," one said (interview with a student, female, age around 20, Yakutsk, 2018). Darbasov (2006) noted the city has high housing costs balanced in part by relatively low costs for heating and water thanks to substantial municipal subsidies that cover the critical situation with the deteriorating heating and housing infrastructure. The water supply system was built in 1973 when the population of Yakutsk was about 126,000 people (about one-third of what it is now), and a new water supply system was expected to be built in 2018 (Guseva 2017). According to the Ministry of Ecology, Nature Management and Forestry of the Republic of Sakha (Yakutia), during the winter, the manganese content in water in the Lena River exceeds the norm by 3.7 times (Gosudarstvennyi doklad 2015). Meanwhile, Yakutsk tap water sometimes has a dark brown color, dubbed the color of Pepsi. Households able to afford bottled water buy it, while others filter their water.

The poor air quality in the winter is caused by the Yakutsk coal-burning power plant and the practice of car owners to leave engines running 24/7 during the coldest days to avoid having the engines freeze. Some car owners stop using cars during the cold season because the expenses for gas and maintenance peak this time of year. Instead they may rely on InDriver (a local analogue of Uber) or may use public transportation. In the city center, the local authorities constructed fourteen bus stops with heating that were criticized on local Internet forums for attracting homeless people. Other challenges of living in a city with extreme climatic conditions include the limited use of open-air public spaces, high costs of heating (required nearly

nine months a year), poor water quality, and polluted air in the winter time. The parks and squares are hardly walkable in the winter, when temperatures drop below –40 C, or in the summer, when temperatures rise above 30 C and there are few trees to provide shade. While wealthier urbanites socialize in cafés, shopping malls, and movie theaters, the poorer ones have fewer options, although they may participate in cultural and sports events and visit the Technopark, a regional center for the development of innovations (Technopark Yakutia 2019).

According to U. A. Vinokurova (1992), satisfaction with the environmental conditions in the city depends on the social background of urbanites: Those who have witnessed higher levels of infrastructure development are more critical about current environmental conditions, while migrants from rural areas are more accustomed to enduring even worse conditions.

Cultural Economy

The countryside remains one of the most important elements of everyday life in general and the local economy in particular. Products of traditional subsistence activities (e.g., hunting, fishing, and reindeer herding) are widely used by local citizens. As Ventsel (2016) pointed out, the traditions of reciprocity have been transformed in urban conditions. Currently the urban residents are using the urban–rural networks to develop a division of labor and circulation of money between the city and the village. Their circulation at the individual level depends on social networks and transportation accessibility. Those who have relatives in more-accessible villages can receive traditional products from there, sending in return goods that they buy in the city.

Some of these village products, such as fur coats, shoes, *unty* (shoes made of reindeer skin), and *torbaza* (shoes made of felt) are predominantly produced in Yakutsk. Among the companies working in this sector, one can differentiate between enterprises that receive subsidies from the republican and city budgets, and those that receive subsidies from independent companies. Despite their similar output, they pursue different economic strategies. Among the republican enterprises there are "Taba" (Reindeer) and "Sakhabult" (Hunter) (Sirina 1999). With republican-level support, they collect fur and antlers, operate processing plants to produce reindeer meat products and process antlers to make vitamins, para-pharmaceuticals, and beauty products. These efforts have not yielded a profit. Among the independent companies are numerous small enterprises, and the

largest of these, Sardaana, specializes in producing traditional clothes and souvenirs. In contrast with the state-backed companies, they do not take risks by investing in new production that may not be economically viable. Sardaana has stable income and has worked with the same customers and partners for years.

The importance of access to culturally relevant food has been emphasized in numerous works. According to the most popular tourist site (tripadvisor.ru), there are 257 restaurants (including cafés, fast food restaurants, etc.) in Yakutsk. The city boasts the most such institutions in the Russian Arctic cities; for example, in Arkhangelsk there are 163 and in Murmansk there are 200. With development of the Arctic sea route there are hopes not only for resource extraction, but also for opening new connections for local communities. In particular, the Northern Forum supports the culinary traditions of the Arctic peoples presented in such restaurants as Muus Khaya, where a chef experiments with local products, such as the salad Indigirka featuring *stroganina* (raw frozen fish), dishes with reindeer meat, *salamat* (sour cream cooked with flour), and other delicacies. Despite being promoted as locally produced food, it is actually produced hundreds of kilometers away. However, these dishes are superior to fruits and vegetables of questionable quality grown thousands of kilometers away. While few individuals are employed in traditional food production, efforts to promote traditional activities in this sector are significant in terms of both budget expenditures and cultural value.

Images of the extreme local environment are used by local products such as the gaming app Dirt On Tires (Andi Game) or the YouTube video Seekers Notes (MyTona) about Sakha villagers (AyalAdamov 2017), as well as a variety of music, songs, and dance performances (Ventsel 2014), and especially in the film industry. Although movie theaters are part of the official statistics, there has been no information available online about their presence across Russian Arctic cities since 2013. Nevertheless, Sakha films are increasingly visible on the global scene. The republic's Ministry of Culture organizes an international film festival that hosts participants from most of the Arctic countries and beyond. The twenty film studios operating in Yakutsk produce ten to eighteen films every year (Kuvshinova 2016), with some achieving commercial success. For example, the film *Heroes: Battle for the Prize*, cost 100,000 rubles to make, but sales revenue brought in 5 million rubles. *Paranormal Yakutsk* likewise cost 60,000 rubles to make and went on to earn 2 million rubles (Moiseev 2014). The films are popular with local audiences since they depict local landscapes, social problems, beliefs, and familiar faces. Predominantly, the films are made

in the Sakha language since those made in Russian less frequently achieve economic success. As the quality of the films improves, they reach larger audiences. For example, the film *Bonfire* received the ImagineNATIVE award for the best dramatic feature. At the Busan International Film Festival in 2017, twelve films represented Sakha Republic (NewsYktRu 2017).

Another way of capitalizing on local environment is through cultural tourism development, which is considered one of the main prospects for economic development. Numerous delegations and tourists visiting Yakutsk are taken to Ytyk-Khaya, a park 6 kilometers (km) from the city that displays traditional Sakha housing and infrastructure, or to the Permafrost Kingdom, a tourist area 13 km from the city center. Some may believe that only outside the city is it possible to experience the real Yakutia. This trend is supported by the tourism industry, which is more oriented on exploring the republic's natural resources than on its cultural riches. For example, the extreme cold, permafrost, mammoth remnants, and diamonds are advertised as tourist attractions. The Kingdom Permafrost museum, the Mammoth museum, and the Treasury of The Republic of Sakha (Yakutia) are among the most popular tourist destinations in the city, according to the tourist site TripAdvisor (Tripadvisor 2019). Among the events attracting the most visitors one can distinguish the Children of Asia Games, the national holiday for the celebration of the Sakha new year—Yhyakh—and the Winter Starts in Yakutia festival.

The Children of Asia Games in 2012 was used as an opportunity to build a 26,000-square-meter sports complex that includes an indoor stadium with a capacity of three thousand people, halls for boxing and wrestling, a cafeteria, medical aid station, conference room, press center, hotel with 122 rooms, and other facilities under a single roof. Its cost is estimated around 2.5 billion rubles (Ponomareuva 2012). It is the only stadium built on pilings, a form of construction on permafrost to avoid warming the ground beneath the buildings. With winter lasting six months, the indoor recreational facilities form an important part of the public spaces in Yakutsk. Moreover, the sports complex's central part simulates traditional Sakha housing since it has a watchtower resembling a *serge* (traditional Sakha construction). The facility serves to separate Yakutsk visually from other cities. What really distinguishes the urban landscape around the stadium, however, is the increasingly boggy Lake Saysary on one side, and poorly maintained automobile roads on the other.

The Yhyakh is organized during the last weekend of June, during the summer solstice, and lasts for two days. The event takes place

in the specially built architectural-ethnographic complex Us-Khatyn about 20 km from the city. The complex includes more than 250 different buildings, including the hippodrome and center for *kumys* (horse milk) consumption, with ten thousand seats each, about one hundred *uraha* (light wooden houses) designed to host gatherings of different organizations (such as Yakutia Airline, the Communist Party, different *uluses* (municipal units in the Republic of Sakha (Yakutia), equivalent of counties), Ministry of Emergencies, and others). For the representatives of ethnic minorities, including small-numbered Indigenous peoples and old believers, a special area is allocated every year where the new construction is scheduled. For instance, there are houses created in traditional style for Evens, Evenks, and Dolgans; in addition, space has been set aside for the Yukagirs and Chukchis. As the biggest annual event in the city, with an estimated 150,000–200,000 visitors, Yhyakh has been used several times to set Guinness World Records—the most *khomus* players, participants in *ohuokhai* (a traditional Yakut collective dance), *kumys* consumption, and participants in national costumes. During the event, there are traditional collective *ohuokhai* dances, concerts, contests for Olonkho epic performers, and traditional cuisine, horse races, *kumys* consumption, traditional sports competitions, a fair, and various other activities. While these events have been criticized for their high cost, they are appreciated by others as an opportunity to promote and revitalize circumpolar cultures.

The Winter Starts in Yakutia festival includes the Diamonds of Yakutia fair, the Snow and Ice Sculptures International Competition, Diamond Notes Children's Creativity Competition, the Zero Arctic Biennale of Contemporary Art, the Taste of Yakutia Gastronomic Festival, and Games of the North Northern Multisport Competition. There are also round tables of Research, Intellectual Creativity and Artistic Practice; and forums to discuss issues of Yakutia ecotourism development (Winter Starts from Yakutia 2019).

Conclusion

Studies examining culture for sustainability make it possible to ask more questions about the social, economic, and cultural priorities in the city's development, planning, and everyday life. Based on a case study of Yakutsk, we highlighted the complexity of relations between culture and environment in the case of an increasingly urbanized Indigenous people.

The strong agency of the local cultural elites is apparent since they serve as spiritual leaders for the whole republic; and form the agenda for its development not only in the field of culture, but also in the economy, human environment, and social relations shaping city governance. This agency is materialized in the number of cultural institutions, production of books, and mass-media, and is strongly related to education that includes numerous programs and textbooks, qualified teachers, hours dedicated to learning native languages and cultures, choice of the language of instruction and so on. Simultaneously, we need to keep in mind the natural resource extraction that provides financial resources for such cultural development.

Contact with nature is another topic where more quantitative and qualitative studies are needed. Whereas the researchers preparing the Arctic Social Indicators (Larsen and Schweitzer 2010) used consumption or the harvest of traditional foods as a main indicator of closeness to nature, such data is not publicly available in the case of Yakutsk and does not embrace the variety of issues related to the urban style of life. The problems of preserving a city's unique mix of cultures as well as infrastructure on permafrost need further discussion. In particular, there is a need for updated publicly available data on the share of housing with central heating, hot water, water, and air quality.

The Archy House and other religious buildings, new stadium, ethnic restaurants, theaters, and linguistic diversity form the unique cultural landscape of the city. Meanwhile, other Arctic cities can learn from Yakutsk's efforts to provide farmers' food to the city, to build warm bus stops, and to invest in the knowledge economy. In the field of the cultural economy, we find numerous examples of using culture and environment as a symbolic resource. Proliferation of the cultural economy is reflected in the numbers of businesses selling ethnic clothing, kitchenware, jewelry, souvenirs, and films and music, as well as in the number of significant cultural and sports events. While the revenue generated by these enterprises is meagre in terms of income for the city budget, the business and sport activity play an important role in the image of the city and the identity of its citizens.

As a result, we find that it is important to use quantitative indicators of cultural development as points of departure for the preliminary assessment of urban sustainability. Furthermore, for deeper analysis and more-informed decision making, the quantitative data should be placed into the broader context provided by qualitative social studies focused on understanding the role of culturally specific desires, habits, strategies, and tactics of locals in producing, maintaining, and using

cultural institutions, cultural economies, public and private spaces, and the architecture and landscape of the city for urban sustainability.

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Notes

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2. The category of "small-numbered indigenous peoples" is the author's translation from "*korennyie malochislennyie narody*" – native groups with fewer than 50,000 members (Balzer 2013: 509).
3. We especially thank Ulyana Vinokurova, PhD, whose books sparked the lead author's interest in Yakutsk and circumpolar civilization, as well as Victoria Filippova, who read the first draft of the paper and made helpful comments and suggestions for its improvement, and all other colleagues who made the paper possible.

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CHAPTER 5

Assessing Energy Security in Nome and Lavrentiya

How Breaking Down Energy and Governance Silos Makes a Difference

Katherine A. Weingartner, Evgenii Antonov, and Alexey Maslakov

Introduction

The greater a city's energy security, the more sustainable it is.[1] Recognizing the particularly high importance of energy security to Arctic cities and the critical role that governance plays in a city's energy state, cities stand to benefit from having a way to evaluate whether and to what extent their governance structures inhibit or advance their energy security. This chapter aims to highlight how ISO 37120's treatment of energy and governance as separate, siloed disciplines may impact a city's ability to fully account for differences in sustainability in relation to other cities. To do so, this chapter compares how Nome, Alaska, United States, and Lavrentiya, Chukotka Autonomous Okrug, Russia, perform on ISO energy and governance indicators. It also compares how successfully these indicators measure potential differences in energy security despite these communities having similar energy challenges, and if these indicators explain why one city may be more sustainable than the other. Based on the outcomes, the chapter offers an explanation of where the indicators succeeded, fell short, and can be improved. For the purposes of this chapter, energy security will be defined as the uninterrupted

availability of energy sources at an affordable price (International Energy Agency 2017).

Two ISO energy indicators were found to adequately measure energy security differences between Nome and Lavrentiya while none of the ISO governance indicators informed our understanding of these energy security differences. Based on the two ISO energy security indicators, Lavrentiya and Nome reached similar levels of energy security. Recognizing that any Arctic index would benefit from including an indicator that captures the relationship between energy and governance, this chapter suggests a potential indicator be added that highlights government financing mechanisms for renewable energy projects. Given that energy challenges are ubiquitous throughout Arctic communities of all sizes, lessons learned from these case studies should have a level of transferability to other Arctic cities and indexes, both within and beyond the Partnerships for International Research and Education (PIRE): Promoting Urban Sustainability in the Arctic project.

Reasons for Selecting Nome and Lavrentiya

We selected Nome and Lavrentiya for several reasons. First, both communities lie in the Bering Sea region, an important yet understudied part of the Arctic generally and the Arctic PIRE project more specifically. Though the Arctic PIRE project limits its index analysis to cities with populations of at least twelve thousand people, this book provides an opportunity to expand the project scope to smaller populations that provide the economic, cultural, social, and political functions of a city for their citizens because no other city exists in proximity (see Carrie Schaffner's chapter on Arctic Cities in this volume). Nome is a city of 3,841 people (K. Morton, e-mail message to author, 3 January 2019; 2018 estimate) located on the Seward Peninsula's Bering Sea coast. Lavrentiya, a remote community of 1,185 people (Rosstat 2018; 2018 estimate), is the third easternmost settlement in Eurasia after Uelen and Ichoun. Although Lavrentiya is the only district administrative center in the Chukotka Autonomous Okrug that lacks urban status due to its small population, the community merited inclusion in this chapter because it functions as the administrative center of the Chukotka District of the Chukotka Autonomous Okrug and makes up around 30 percent of the district's total population (Rosstat 2018).

Second, the contrast between Nome and Lavrentiya sharing similar geographies and energy challenges while differing in governance

structures makes it easier to assess how different governance approaches may influence community energy security. The comparison of Nome and Lavrentiya uses a most-similar approach that involves identifying largely similar case studies that differ in a key variable or variables of interest in order to explain how such similar cases may lead to varying outcomes (Koivu and Hinze 2017). Both communities have similar energy challenges and, as previously mentioned, comparably small populations, but differ in their governance structures. In terms of energy, both Nome and Lavrentiya are accessible only by barge or plane, meaning that all energy must be imported or produced locally. By contrast, the Russian political system is more centralized with its municipalities having fewer rights and responsibilities compared to US cities operating under the more distributed US political system. These governance characteristics are likewise mimicked in the municipal energy systems of each country.

Third, the fact that Nome's population is growing while Lavrentiya's is contracting highlights how communities may need to consider different approaches to enhancing their energy security depending on where the community is located on a boom-and-bust cycle. Nome's population sharply declined after its 1900 population boom but has had a slight but steady upward trend after the 1920 census (Population.us 2014). Lavrentiya's population peaked at 3,012 people in 1989 (Russian Census 2019); as of 2016 it had decreased by more than 60 percent (Rosstat 2018). Population growth rates can play a significant role in decision making to ensure citizens of a given community have access to the energy they need today, as well as in the future.

Finally, sufficient access to data for both case studies provided additional justification for their selection. Given data access limitations on the Russian side, it was critical to select a Russian city in which the PIRE team already had some expertise. For this reason, Lavrentiya was selected. Team contacts in Nome and its engagement in developing renewable energy sources (RES) also made it a logical selection for the study.

Introduction to Nome and Lavrentiya

Nome Short History

Historically, the Seward Peninsula has been occupied by the Malemiut, Kauweramiut, and Unalikmiut Eskimos. Though gold was known to

be in the area, it was not until the great gold discovery of 1898 by the Three Lucky Swedes (Jafet Lindberg, Erik Lindblom, and John Brynteson) that Nome began to see significant development (State of Alaska 2017). In Seattle and San Francisco thousands boarded ships sailing for Nome, drawn by the possibility of wealth and prosperity, and the city rapidly grew (Visit Nome, Alaska 2015). The City of Nome was officially formed in 1901 (State of Alaska 2017). Mining continued to be Nome's economic base until the 1960s when rising production costs exceeded declining gold prices. The industry briefly reemerged in the 1970s before declining once more in the 1990s (Stinson 1991). In World War II Nome served as a stop on the route transporting US aircraft to the USSR to help the Soviets fight the Germans on Germany's Eastern Front. Attempts by Alaska to develop its oil industry had struggled since the early 1900s but gained momentum after the Trans-Alaska Pipeline System was completed in 1977 (American Oil and Gas Historical Society 2019; "Trans-Alaska Pipeline" 2019). The resulting infrastructure developments benefited Nome—as did the oil revenue. However, recent declines in oil prices have taken a toll on the Alaska state budget with consequences for its cities. Though Nome's economy still benefits from fossil fuel development, other areas both within and beyond government drive the economy, with the most common employment sectors in 2016 being public administration, retail trade, and health care and social assistance (DataUSA 2017).

Lavrentiya Short History

Lavrentiya is located in Saint Lawrence Bay, both sides of which were historically settled by the sea-hunting Chukchi people. The 1920s arrival of the Soviets in Chukotka launched the policy of sovietization aimed at creating a socialist society through population education and local economic development. During World War II the airfield in Lavrentiya was used as an intermediate point for the supply of goods under the Lend-Lease Program. Lavrentiya's development was accelerated by a campaign to transfer the Chukchi and Eskimo people into larger, more-concentrated settlements in order to optimize medical care and education access after World War II. Largely due to its strategic location, Lavrentiya was approved as a regional hub, the base for a border guard unit, and the host for a major military contingent in the event of a possible confrontation with the United States during the Cold War. After the Cold War and especially following the collapse of the USSR, the settlement's strategic importance decreased and the

military presence there was significantly reduced. In response to both the disappearance of many services and enterprises when the military presence shrank, and to a dramatic decrease in living standards, including a lack of food in stores and high unemployment, most of the local population left for the mainland in search of a better life.

Methodology

This chapter uses preliminary energy data for Nome gathered from publicly available online sources, most of which were published by government entities. Although energy data is generally available at the state level, it was more difficult to find information specific to the city. This data availability challenge made it necessary to reach out to individuals working in the areas of energy and governance for the city, employees of the local utility, and other experts. Such contacts also enabled the chapter to collect the most up-to-date energy data as well as to better understand the nuances of the energy management process for Nome.

Energy information collected for Lavrentiya came from thematic literature on Chukotka's energy sector, public-access analytical data, and official information disclosed by local executive authorities within the framework of annual reports and in development program preparations where analytical explanatory notes were available. Chukotka region territorial planning documents, Lavrentiya's master plans including explanatory notes, and official statistical materials were also used. Finally, we incorporated information from the official website of the Municipal Unitary Enterprise Iceberg, which serves the communal sector of the settlement. Although Lavrentiya is an independent municipal unit within the Chukchi District, it lacks its own website, which forced greater use of the Chukotka District's website, municipal enterprises, and other official sources.

We used community expert consultations, government resources, public-access analytical data, annual reports, official statistical materials, and other resources to evaluate the governance processes for Nome and Lavrentiya.

Nome and Lavrentiya Energy Challenges

Nome and Lavrentiya face similar energy issues but have different approaches to addressing them. Given their isolated energy systems,

limited accessibility by only barge or plane, and other geographic challenges, the cities are both largely dependent on high-cost fuel imports from outside their region. Each community has had varying and limited success in incorporating renewable energy into their energy mixes and neither has come close to fully realizing its renewable energy source (RES) potential.

Nome's primary energy challenge is cost. Around 95 percent of its energy production comes from expensive diesel generation. With the added expenditures of transportation and storage, the city's electrical production costs are almost three times the national average (K. Morton, e-mail message to author, 9 February 2018). The city's islanded microgrid of 2.7–6 megawatt (MW) power levels is unable to connect to the US grid system (University of Alaska, Fairbanks n.d.). Given Nome's remote location, shipping diesel and other fossil fuels to the city is expensive (Shaw 2017). The city's isolation also means that fuel delivery disruptions can pose a threat, as was the case in 2012. That year, Nome's winter fuel delivery failed to arrive before the harbor turned to ice. With no other alternatives, a US Coast Guard icebreaker guided a Russian tanker holding 1.3 million gallons of emergency fuel to Nome under difficult conditions (Yardley 2012). Nome's vulnerability to fuel delivery disruptions given its high dependence on diesel imports (Alaska Center for Energy and Power 2012), combined with increasing energy costs and demand for heat, electricity, and transportation fuel (Alaska Energy Authority [AEA] 2016a) have encouraged the city to bolster its energy security by incorporating more RES into its energy mix (Johnson et al. 2012). Despite constraints on its ability to augment its wind, geothermal, and solar energy resources, Nome's primary utility told chapter authors that it would support any reasonable proposal to reduce energy costs (K. Morton, e-mail message to author, 9 February 2018).

Lavrentiya shares many of Nome's energy challenges. The only energy resources currently produced in Chukotka are coal and natural gas. The region has oil fields but challenging Arctic conditions and a relatively small capacity for extensive oil field development prevent their use. The closest refinery is located in Khabarovsk Kray, almost 3,500 kilometers (km) from Lavrentiya, meaning that most of the community's energy relies on diesel. Since diesel fuel is not produced in the region, Lavrentiya is critically dependent on expensive imports by sea from other regions of Russia (mostly from Khabarovsk Kray) that run the community's diesel power generators and coal-fired boiler houses. As a result, the energy sector remains vulnerable, inefficient, and dependent on maritime transport during

the limited navigation period. Like all subdistricts and settlements in the Chukotka Autonomous Okrug, Lavrentiya is not connected to the national grid, making it vulnerable to interruptions in the supply of fuel or equipment failure. Though the Chukotka Peninsula has one of the best conditions for wind power generation in Russia and the potential to develop geothermal energy (Polyak et al. 2010), there are currently no profitable RES projects in the region.

ISO Indicators

Recognizing ISO 37120's goal to provide a consistent and comparable approach to evaluating local sustainable development, this chapter has chosen to use ISO indicators to determine energy security levels in the selected communities. Table 5.1 includes the available data for each ISO energy and governance indicator for Nome and Lavrentiya, respectively. Based on this data, we examine if there are any critical gaps in the indicators, whether the selection of indicators is appropriate, and finally the effectiveness of each indicator. Before we evaluate the success of the indicators, however, we provide additional context for the energy and governance structures of each community.

Current State of Nome and Lavrentiya Energy Systems

Nome Energy Capacity and Funding

In terms of nonrenewable energy, Nome consumed 1,876,751 gallons of diesel in 2017. Net diesel-generated power (production less station service) was 30,542 megawatt hours (MWh), representing 95 percent of the city's energy needs. Though the city also uses fuel oil for heating and the majority of hot water systems, this chapter focuses specifically on fuel used for electricity production (K. Morton, e-mail message to author, 9 February 2018).

To meet the majority of its energy needs, Nome owns and operates the only commercial electrical generation operation in the community through its component unit Nome Joint Utility System (NJUS). This effort uses two primary 5.2 MW diesel generators, which run alternately, and an old plant containing 3.6 MW and 1.8 MW generator units, which can be used if needed. A single 5.2 MW unit is usually sufficient to meet peak loads (K. Morton, e-mail message to author, 9 February 2018).

Table 5.1 | *ISO energy and governance indicator results for Nome and Lavrentiya*

Energy indicators	Nome	Lavrentiya	More sustainable community based on indicator results
7.1—Total end-use energy consumption per capita (GJ/year, electricity only)	70.84 GJ/year (2018)[a]	61.15 GJ/year (2016)[b]	Lavrentiya
7.2—Percentage of total end-use energy derived from renewable sources	5% (2018)	0% (2018)	Nome
7.3—Percentage of city population with authorized electrical service (residential)	100% (2018)	100% (2018)	Equal
7.4—Number of gas distribution service connections per 100,000 population (residential)	0 (2018)	0 (2018)	Equal
7.5—Final energy consumption of public buildings per year (GJ/m2)	Unavailable	Unavailable	Insufficient data
7.6—Electricity consumption of public street lighting per kilometer of lighted street (kilowatt hours/year)	Unavailable	Unavailable	Insufficient data
7.7—Average Annual hours of electrical service interruptions per household	Unavailable	Unavailable	Insufficient data
8.3—Greenhouse gas (GHG) emissions measured in tonnes per capita (adapted for electricity sector only)	4.96 tonnes per capita[c] (2018)	4.55 tonnes per capita (2016)[d]	Lavrentiya

Governance indicator	Nome	Lavrentiya	More sustainable community based on indicator results
10.1—Women as a percentage of total elected to city-level office	33% (2019)[e]	60% (2018)[f]	Lavrentiya
10.2—Number of convictions for corruption and/or bribery by city officials per 100,000 population	Unavailable	Unavailable	Insufficient data
10.3—Number of registered voters as a percentage of the voting age population	91.3%[g] (2017)	100%	Lavrentiya
10.4—Voter participation in most-recent municipal election (as percentage of registered voters)	23%[h] (2018)	54.83%[i] (2017)	Lavrentiya

Notes:
GJ = gigajoule.

[a] Calculation: Net consumption of diesel (1,876,751 gallons), 1 gallon is about 3,785 liters, average density of diesel fuel is 840 kilograms (kg) per 1,000 liters, weight of 1 gallon is about 3.179 kg (Engineering ToolBox 2003), resulting in total consumption of about 5,966.94 tons. Maximum gross calorific value for diesel fuel is 45.6 megajoule (MJ)/kg, so total energy consumption is 5,996,940 kg * 45.6 MJ/kg=272,092.56 GJ or 70.84 GJ per capita (with Nome population 3,841).

[b] Calculation: see process for Nome. Value includes only diesel consumption (electricity). We use value of fuel consumption to produce heat and electricity for public consumption in public utilities (MUE Iceberg 2019).

[c] Accounting for diesel only.

[d] Accounting for diesel and coal only.

[e] Two out of six city council members were women as of 27 April 2019 (The City of Nome Alaska 2019).

[f] Value from expert research.

[g] We added Nome No. 1 and Nome No. 2 districts to get the total for December 2017 registered voters: (State of Alaska Division of Elections 2017). 2017 estimated population under 18 is 34.8%, 65.2*3690 (2017 population estimate) = 2405.88 (estimated 2017 population ages 18 and older). Sources - Nome population under 18: (United States Census Bureau. 2018).; est. 2017 population: Department of Labor and Workforce Development 2018).

[h] 643 votes cast/2788 registered voters (precinct No.1 + No.2) for 10/2/18 election (B. Hammond, City Clerk/Treasurer, City of Nome, e-mail message to author, 6 February 2019.

[i] "Elections, Referendums and Other Forms of Direct Will" 2017).

Table 5.2 | *PCE and effective residential rate for the first 500 kWh, selected years*

Fiscal year	PCE	Effective residential rate (per kWh)
2018	$0.1304	$0.25
2017	$0.0979	$0.23
2015	$0.1355	$0.23
2012	$0.1709	$0.20

Source: Nome Joint Utility System.

Recognizing the high cost of energy in remote areas of Alaska, the state established the Power Cost Equalization (PCE) program to lower rates statewide to the same level as in Alaska's major urban areas for the first 500 kilowatt hours (kWh) (PCE 2014). The PCE is reviewed every year and reflects a payment made by the State of Alaska on behalf of energy consumers. With the PCE, Nome ratepayers fund the operation and maintenance of the community power system (K. Morton, e-mail message to author, 9 February 2018). In fiscal year 2018 the effective residential rate of energy for Nome (residential rate after PCE) was $0.25/kWh for the first 500 kWh (AEA 2018) (table 5.2). For comparison, the average residential rate for Anchorage in 2018 was $0.23/kWh (Utilities Local 2018). Table 5.2 shows the PCE and effective residential rates per kWh in Nome for select years (K. Morton, e-mail message to author, 14 January 2019).

It is worth noting that, although Nome has energy tariffs, they do not vary by consumer base but rather on what services a consumer is receiving. Different tariffs do not exist for business consumers compared to residential consumers. Instead, consumer tariffs vary depending on whether a consumer is receiving single-phase or three-phase service (K. Morton, e-mail message to author, 9 February 2018). Whereas single-phase service is generally more efficient for units requiring up to 1,000 watts of power, three-phase service's higher carrying capacity allows it to provide power for higher load systems (AEGIS 2015). Any consumer receiving single-phase service pays a facility charge of $20 and an energy charge that depends on whether the power is being provided within or outside city limits. Those receiving three-phase service pay a higher facilities charge of $60, a demand charge of $10/kilowatt (kW), and lower energy charges both within and outside city limits compared to single-phase rates (K. Morton, e-mail message to author, 9 February 2018).

Nome Renewable Energy

In addition to diesel generation, Nome produces electricity using wind turbines. In 2013 NJUS assumed control of Banner Wind LLC, which had managed the city's wind energy operations. Banner Wind LLC resulted from the joint efforts of the Bering Straits Native Corporation and Sitnasuak Native Corporation who invested in wind energy as a means to create jobs, enhance overall power generation reliability, offer a tax credit and cash based revenue stream, and keep revenue in the community (Alaska Industrial Development and Export Authority 2008). To accomplish these goals, the project used private funding to install the original wind farm with a fleet of 50-kW Entegrity units in 2009; in addition, through partial support from the Alaska Renewable Energy Fund, NJUS installed two Emergya Wind Technologies (EWT)-900 wind turbines in 2014 (Holdmann 2015). Today these units account for 5 percent of Nome's electricity generation. Net wind generation in 2017 (production less turbine service) was 1,918 MWh.

The city is interested in introducing additional wind energy into its energy mix but doing so requires overcoming several challenges. First, smaller diesel generators need to be procured and used on windy days or during times of low load. Diesel generators in Nome do not run at less than 60 percent of rated capacity. During periods of low load and high winds, wind energy generation must be cut back to keep diesel generators operating above the 60 percent level. Second, energy storage is needed to supply the grid with power when base-loads rise or wind generation slackens. Third, the availability of excess energy can be aligned with times of additional power consumption. For example, a smart management system could use available excess wind energy to heat public buildings, power the community water supply, or for other uses. Additionally, an alternative electrical pricing structure could be used during periods of excess wind supplies to shift the load balance to these periods (K. Morton, e-mail message to author, 9 February 2018).

Organizations in Nome have also invested in solar projects but the generated solar energy does not provide power to the NJUS distribution grid (K. Morton, e-mail message to author, 9 February 2019). For example, the Bering Strait Native Corporation of Nome installed a solar photovoltaic system on their office building in 2008 that generated 16.8 kW of power, removing the need for about 1,000 gallons of diesel each year or around 0.05 percent of the city's 2017 diesel consumption. The corporation also installed two solar water heaters

on local buildings (AEA 2016b). A utility-sized solar array could lower diesel use but faces issues with grid integration that are similar to those mentioned for wind generation (K. Morton, e-mail message to author, 9 February 2018).

Though there is potential for geothermal and hydropower generation, accompanying challenges have blocked their development. The Pilgrim Hot Springs, located around forty-four air miles northeast of Nome, was assessed as a possible source of geothermal energy to offset the city's diesel dependence, but the costs of building and operating a needed line extension and difficulties finding a satisfactory hot water source halted development. Some opportunities for hydropower have been identified, though local support for such efforts remains insufficient to overcome implementation challenges (Hirsch 2013).

Lavrentiya Energy Capacity and Funding

Although the Chukotka Autonomous Okrug has several large thermal power stations fueled by coal and a nuclear power plant, Lavrentiya continues to rely on diesel for its electricity production. Despite the existence of these other power plants in the region, the nearest one to Lavrentiya is an old system in Egvekinot and there are no power lines to connect the two. It is not economical to build new lines because of the small consumption on the Chukchi Peninsula. Consequently, diesel power generators make up 100 percent of electricity production in Lavrentiya and all other settlements in the region. In 2016 Lavrentiya's diesel generators produced 7 MWh of electricity. The entirety of Lavrentiya's heat energy comes from two coal-fired boiler houses located in the settlement.

Lavrentiya sells energy to customers at different rates. Until 2017 private business bought electricity and heat at full price. Prior to that year, residential customers benefited from tariffs that significantly reduced the price of energy from the actual cost through subsidies. In Lavrentiya, if the average worker had to pay the full cost for energy, the outlays would consume 70 percent of his or her income. In Neshkan, a more isolated area of Chukotka, for example, energy expenses would be even higher than the average income. Since 2017 the Russian government has introduced new tariffs for consumers in isolated energy zones that are not part of the national network that includes the Chukotka region. The goal of the new tariff structure is to revive the economy and create conditions for development in isolated zones. The subsidy for the tariff reduction is paid by all other

consumers in the country. This decision should have a notable impact on local economies within these isolated energy zones, but it is too early to assess its results, including any impacts it may have on the development of alternative energy. For the purposes of this chapter, therefore, the following text refers to pre-2017 conditions. Though new rules facilitating the construction of RES may have a positive impact, it is unlikely to be much of one. The key problem remains in the rates and cost of energy produced.

High energy costs stem from the heavy reliance on energy imports in most of the region. If residential and business consumers paid full price for energy, it would be impossible to develop a local market economy. For this reason, the difference between the full and subsidized cost of energy as well as maintenance and equipment modernization costs are covered by regional and municipal budgets. Affordable energy sector tariffs, which consume approximately 10–15 percent of an individual's income, are possible only in the large cities of Chukotka. For example, the city of Anadyr has lower energy costs due to more efficient energy generation from its own large heating power plant. In general, the full price for energy resources in Chukotka is three to ten times higher than it is in mainland Russia (see table 5.3).

Lavrentiya Renewable Energy

Lavrentiya could benefit from potential undiscovered geothermal energy resources given its location within the Chukchi Municipal District, one of the richest geothermal energy sources in the Chukotka region, with two dozen known hot springs. One of the most famous and closest thermal water deposits is 20 km from Lavrentiya, in Lorino. Geothermal groundwaters can have a wide distribution from their original source. However, exploration drilling and other geothermal exploration activities stopped in the late 1980s due to the economic crisis of that era, resulting in a lack of reliable information on geothermal reserves and availability. Assessing the potential to incorporate geothermal energy into Lavrentiya's energy system is currently not a priority, as evident by the lack of effective geological exploration. Although it is possible to use small electric power plants with a 1–2 MW capacity (Vakin 2003), which could be sufficient to supply power to Lorino or Lavrentiya, Lavrentiya's remoteness and difficult hilly terrain makes geothermal an unlikely heating source for the settlement.

A more promising renewable energy option for Lavrentiya is the development of wind power. Although the Chukotka Autonomous

Table 5.3 | *Tariffs for utilities in different settlements of Russia*

Settlement	Monthly expenses for main utility bills (US$)*		The average wage of an employee after tax (US$)	Share of expenses for utility payments from average wages, percent	
	Population tariffs	Actual cost to produce		Population tariffs	Actual cost
Lavrentiya	61.7	441.1	644.5	9.6	68.4
Neshkan	54.6	675.3	511	10.7	132.1
Anadyr	92.6	220.3	954	9.7	23.1
Khabarovsk (mainland)	83.2	74.8	407.8	20.4	18.3

Source: Municipal Enterprise Iceberg and the Committee on Prices and Tariffs of the Khabarovsk Krai Government.

Note: *Main utility bills include hot water supply, heating, and electricity. The calculations were based on standard consumption rates: 3 cubic meters (m^3) of hot water, 300 (kWatt*hour) of electric energy for a 50-square-meter (m^2) apartment. The calculations were made according to tariffs in the first half of 2017.

Okrug and the territories of the Chukchi Peninsula in particular have significant wind potential, the history of wind energy in Chukotka has been brief and largely unsuccessful. The average annual wind speed on the Bering Sea coast is one of the highest in Russia at about 6 meters (m) per second or more, making it possible to generate wind power even at low altitude. The first attempts to develop wind energy in the region took place in the early 1980s; by the 2000s, however, the lack of experience using wind generators, the absence of local power engineers to maintain the turbines, and insufficient technical solutions to overcome the challenging Arctic climate had prevented this energy source from taking root. During the period when business magnate Roman Abramovich was governor, significant funds were directed to wind energy development, but this effort also proved ineffective for the reasons mentioned above and eventually did not lead to success.

There are many reasons why Lavrentiya lacks RES capacity. Primary among them is the fact that its municipal government does not have sufficient funds for any investment activity or modernization efforts related to the energy sector and existing mechanisms for return on investment make RES projects unprofitable for private investors. In terms of government funds for projects, the regional program "Energy Efficiency and Energy Development of the Chukotka Autonomous Okrug for 2016–2020" does not include RES development or related funds, signaling that the region has no short-term plans to invest in RES (Government of the Chukotka Autonomous Okrug 2016). Though investment mechanisms in Russia are complex, there are two key reasons why RES has not been profitable. First, the RES tariff calculated by the regional energy commission is not large and therefore requires a long payback period. Second, there is no guaranteed buyout for small-scale energy producers under the current RES production rates. Although there is a mechanism that obliges the local power grid organization to buy electricity from local producers or investors, RES production rates are approved by the regional energy commission, but in the amount of no more than 10 percent of network losses. Small energy districts have small losses, so the guaranteed volume of redemption at an attractive tariff is too small to garner investment. Additional challenges to driving RES projects forward include but are not limited to a lack of qualified staff or insufficient interest from public utilities.

There is a plan to integrate Chukotka's regional energy system with the Magadan region's power system to benefit from its excess capacity and lower energy costs by using energy from Kolyma's hydroelectric

power stations. State energy companies are currently designing a high-voltage power line for this purpose in Western Chukotka, seeking to reduce the costs incurred by the high energy consumption of the many mining companies there. However, no such power lines will be constructed in Eastern Chukotka to reach Lavrentiya.

Current Governance Structures in Nome and Lavrentiya

Nome exercises a managerial form of government in which power is held by a council of elected officials who hire a professionally trained manager to ensure the delivery of public services ("Council/Manager" n.d.). Nome's city council is made up of six members who are elected by Nome city voters on an at-large basis. Each member serves a term of three years. Nome city voters also elect the mayor in whom the city's executive power is vested. The duties and powers of the mayor are described by Alaska law, and include implementing official documents approved by the city council and serving as the ceremonial head of the city government ("Mayor" 2018). A publicly elected utility board hires and advises the general manager who serves as the designated energy manager. The general manager is in charge of all day-to-day operations, planning, budgeting, and personnel management, though the city council has final approval of energy rates, budgets, and real property transactions (K. Morton, e-mail message to author, 9 February 2018).

Lavrentiya is the center of the six-settlement Chukotka Municipal District. The district administration is also located in the city and has more power than the local self-governing settlements. The elective head serves for four years, during which time he or she manages the district administration, determines its personnel policy, and effectively holds all power in the district. In each of the six district settlements, including Lavrentiya, there is a settlement mayor, but those mayors' financial resources and powers have significant limitations. Located in Lavrentiya, the Municipal Unitary Enterprise Iceberg is the only organization that manages the entire district's energy sector for its six settlements. Formally, it is an independent organization established and controlled by the municipal administration and is largely financed from the municipal and district budget. Although it is independent, all important decisions, including the purchase of fuel and equipment and choosing priorities for renovations are approved with the administration. The private Chukotka Trade Company and state enterprise Chukotsnab supply the region with coal and oil supplies.

The Role of External Financing

Recognizing how governance structures impact the willingness and capacity of external actors to invest in RES, external financing for such projects will be viewed through a governance—rather than private company—lens. Governance plays two major roles in advancing RES on the city level. First, governments can create financial incentives to spur commercial investment. Second, governments can provide direct financial support for RES projects. Private financing was used to jump-start Nome's wind industry before the turbines were acquired by NJUS. Here, government structures did not prevent community members from investing in a commercial project; after the initial installation of a wind farm, government funding through the Alaska Renewable Energy Fund was used to install more turbines.

In contrast, the pre-2017 energy tariff structure in Russia has created barriers for a commercial RES project to be implemented in Lavrentiya. Under this structure, private investment can realize profits in cases when the Russian state can promise a fixed tariff and adequate volume of electricity to guarantee payback in the long term. Given Lavrentiya's energy demand, Russia's private investment mechanism blocks profitable RES projects from being implemented. Another option may be for a commercial project to fall under a research and development framework to yield returns. At the Tenth Japan-Russia Energy and Environment Dialogue in 2017, installing a 3x300 kWt wind turbine in Lavrentiya was listed as a prospective Russian Energy Agency project (Ministry of Energy of the Russian Federation 2017). Though the project remains in the planning stages and the challenges to implementing RES in Lavrentiya still stand as barriers to this initiative, the project's proposal is evidence of the role commercial and outside government financing can have on RES development in Russian Arctic communities. In both cases, the role of external financing proved important to RES investment, but were hampered by governance structures. Moreover, Russian cities are limited in their access to government funding for RES projects.

Indicator Success in Measuring Energy Security

Two ISO energy indicators (7.1 and 7.2, according to their designation in the ISO document) were found to adequately measure energy security differences between Nome and Lavrentiya. None of the ISO governance indicators informed our understanding of these energy

security differences and several of them seemed flawed in their ability to measure governance more generally.

Energy Indicators

ISO Energy Indicator 7.1—Total End-Use Energy Consumption per Capita (GJ/year, electricity only)

Arctic communities tend to rely heavily on energy imports. Consequently, the more energy they consume, the greater their vulnerability to energy import disruptions and the less energy secure they become. By measuring electricity consumption per capita, this indicator provides useful insights on how dependent an Arctic city may be on energy imports, accounting for differences in overall population size. In doing so, the indicator can be used to determine levels of energy security in Arctic cities and would be valuable to include in an Arctic city sustainability index. Based on the indicator results, Nome consumes more electricity per person than Lavrentiya, which indicates that Nome is slightly less energy secure for this indicator.

ISO Energy Indicator 7.2—Percentage of Total End-Use Energy Derived from Renewable Sources

The more renewable energy in a community's energy mix, the more capable it is to provide uninterrupted energy to its citizens. This capability is especially important in the Arctic where less dependence on high-cost, disruption-prone imports translates into greater energy security. Nome's modest inclusion of RES in its energy mix compared to Lavrentiya's lack of RES shows that Nome is slightly more energy secure than Lavrentiya. Efforts to deliver alternative energy provide meaningful insights into the level of energy security in each community.

ISO Energy Indicator 7.3—Percentage of City Population with Authorized Electrical Service (Residential)

The greater a city's ability to provide residents with authorized electrical service, the more energy secure residents will be. Access to electrical service is so critical to the survival of Arctic communities that it is unsurprising to find that 100 percent of both Nome and Lavrentiya residents have authorized electrical service. Though this indicator is an effective measure of energy security, more research is needed to determine if indicator results vary across Arctic cities. If 100 percent of all Arctic city residents have access to authorized electrical service, given how essential the service is to survive Arctic

conditions, this indicator may be unable to yield valuable or unique conclusions in an Arctic context. Therefore, including this indicator in an Arctic city index is recommended only if further research shows meaningful variance in indicator results in other Arctic cities.

ISO Energy Indicator 7.4—Number of Gas Distribution Service Connections per One Hundred Thousand Population (Residential)

There is no natural gas distribution system in Nome or Lavrentiya. Connection to a natural gas distribution service stands to make a city more energy secure by further diversifying its energy sources. In this way the indicator succeeds in measuring energy security. However, as mentioned for Energy Indicator 7.3, if additional research finds that Arctic cities consistently lack gas distribution service connections, Energy Indicator 7.4 may not generate unique findings across the Arctic. If this is the case, this indicator may not be particularly useful to include in an Arctic city sustainability index.

ISO Energy Indicators 7.5–7.7

Neither Nome nor Lavrentiya were able to provide information for the following indicators:

- ISO Energy Indicator 7.5—Final Energy Consumption of Public Buildings per Year (GJ/m2)
- ISO Energy Indicator 7.6—Electricity Consumption of Public Street Lighting per Kilometer of Lighted Street (kWh/year)
- ISO Energy Indicator 7.7—Average Annual Hours of Electrical Service Interruptions per Household[2]

In particular, Nome stated that it does not collect information in a convenient manner to provide the requested information for these indicators. Though this data may exist for Lavrentiya, it was not available when we attempted to access it.

For Energy Indicator 7.5, the more energy that public buildings consume, the more a city relies on imported fuels to meet those higher energy needs. Therefore, the indicator is an effective measure of energy security. Since cities have more direct control over the electricity use of public buildings, determining a city's performance on this indicator can also prompt cities to take action to reduce building consumption and, in doing so, bolster their level of energy security.

For Energy Indicator 7.6, the more electricity consumed by public street lighting, the more a city relies on imported fuel to meet those higher energy needs. However, more research is needed to determine if the electricity consumption for public street lighting is substantial

enough to pose a notable impact on energy security, especially compared to Energy Indicators 7.1 and 7.5, which present a more comprehensive measure of electricity consumption.

For Energy Indicator 7.7, the more electrical service interruptions per household, the less reliable a city's electrical service, which translates to a reduction in energy security. This indicator provides valuable insights into a city's energy security state.

All three of these indicators can provide useful information on a city's level of energy security. However, if gathering this data for other Arctic cities proves to be as difficult as it has in Nome and Lavrentiya, it may be challenging to produce meaningful results for these indicators. In this case, it may be worth considering the benefit of including the indicators in an Arctic city sustainability index.

ISO Energy Indicator 8.3—Greenhouse Gas Emissions Measured in Tonnes per Capita (Adapted for Electricity Sector Only)

Though this indicator was adapted to measure GHG emissions from the electricity sector only and as such did not directly measure energy security, it still provides useful information about the relationship between energy and sustainability. The results show that Lavrentiya's per capita emissions for the electricity sector were slightly less than they were for Nome, suggesting Lavrentiya's electricity sector is more sustainable. These results are somewhat surprising given that some of Nome's energy is being produced by RES, which generates fewer GHG emissions, while Lavrentiya relies in part on coal, which produces more GHG emissions than diesel. Nome's electricity sector also seems to be more energy efficient. Perhaps the fact that Nome's data is from 2018 and Lavrentiya's is from 2016 accounts for this difference in emissions. As demonstrated in Energy Indicator 7.1, Lavrentiya has lower per capita energy consumption, which may be significant enough to also account for this GHG disparity.

Governance Indicators

ISO Governance Indicator 10.1—Women as a Percentage of Total Elected to City-Level Office

At a fundamental level, this indicator seems to make two key assumptions that challenge its usefulness as a governance indicator. First, it assumes that whoever is elected to city-level office, whether they are men or women, will be capable of making decisions that promote sustainability. However, we have seen that Lavrentiya is dependent on decisions at the regional and federal levels, particularly for its

budgets. Whether Lavrentiya's government was 100 percent female or 100 percent male does not change the fact that the government structure itself does not grant elected officials the ability to make decisions independent from the will of higher levels of government.

Second, though there is no explanation in the ISO for how this indicator measures sustainability, it seems at the very least to suggest that the more women elected in local office, the more sustainable a city will be. However, it stands unproven that women are more likely to make environmentally conscious decisions than men. Based on the results of this indicator, Lavrentiya should be more sustainable than Nome because 60 percent of its officials were women compared to 33 percent in Nome. It is challenging to find support for the idea that Lavrentiya's higher percentage of women in office equates to it being more sustainable, and therefore may play any role in enhancing the energy security of a city.

Though this indicator can serve as a measure of social inclusion, for example, it does not appear to hold much relevance for assessing how governance can impact the electricity sector specifically or environmental sustainability generally.

ISO Governance Indicator 10.2—Number of Convictions for Corruption and/or Bribery by City Officials per One Hundred Thousand Population

The ISO defines sustainable governance as upholding principles of objectivity, selflessness, openness, accountability, leadership, and honesty. Corruption erodes these principles. Although this chapter accepts the idea that corruption in local government reduces its level of sustainability, it is worth noting that a corrupt local government would not measure its own level of corruption, and thus any data gathered by government sources may not tell the whole story. By that same token, the absence of corruption data does not mean a city is free of corruption. Although data was unavailable for this indicator in Nome and Lavrentiya, if accurate data were accessible, the indicator seems to have some capacity to be a successful measure of city governance in relation to sustainability. In fact, if data were available on corruption in the energy sector specifically, such as rent-seeking activities, it could provide useful insights into the sustainability of the sector. However, finding these data is likely to be difficult.

Though this indicator has potential to be a useful governance indicator generally and for energy specifically should such data be available, challenges to finding city-level corruption data and ensuring its accuracy might weaken the power of indicator results or yield no results at all.

Consequently, more research is needed to see how successfully municipal corruption data can be found for other Arctic cities before assessing the usefulness of this indicator as a measure of governance.

ISO Governance Indicator 10.3—Number of Registered Voters as a Percentage of the Voting Age Population

This indicator fails to account for differences in voter registration policies across countries, which can significantly skew results, causing them to reflect an inaccurate picture of local governance. In Russia, anyone eighteen years of age or older is automatically registered to vote, which means all Russian cities, regardless of actual governance differences, would score 100 percent for this indicator. In contrast, the United States requires citizens eighteen years of age or older to register themselves in order to vote; because of this, US percentages for this indicator will be lower. Consequently, US cities will always underperform compared to Russian cities and, therefore, may fail to accurately highlight governance differences among cities in the two countries. For example, indicator results show Lavrentiya to have a more sustainable governance structure than Nome. However, this contradicts our findings that Lavrentiya's local government has little decision-making power whereas Nome has much greater flexibility and capacity to make its own decisions—energy-related or otherwise.

Although the ISO states that instances of automatic registration should be noted, the results can still be misleading upon first glance or lack the ability to be meaningfully compared to other cities with different voter registration policies. The shortcomings of this indicator reduce its usefulness unless all cities being compared require citizens to register. This limitation also lowers the indicator's ability to glean insights on energy governance more specifically. Given the fact that Russia and Scandinavian countries have automatic registration while the United States and others do not, this indicator may not yield as much telling information on Arctic governance as another indicator might. It is worth noting that this indicator does not take into consideration the extent to which elected officials actually represent the interests of their citizens. In this case, the fact that Russia is an authoritarian country while the United States is a democracy is not accounted for in indicator results.

ISO Governance Indicator 10.4—Voter Participation in Most-Recent Municipal Election (as a Percentage of Registered Voters)

Once again, measuring voter participation as a percentage of registered voters can skew results. Countries with automatic voter

registration will have a higher denominator value when calculating this indicator and, consequently, may perform more poorly than those with voluntary registration if the registration values are close, despite true differences in voter participation. To illustrate, if voter participation rates were the same for Nome and Lavrentiya, the fact that Lavrentiya would have a denominator of 100 compared to Nome's 91.3 would skew results in favor of Nome. In practice, Nome's voter participation rate was so low that, in spite of Nome's calculation advantage, Nome still compared poorly to Lavrentiya. According to these results, Lavrentiya is more sustainable. Though this indicator can provide a better measure of governance than others examined here, it still shares some of the weaknesses of Governance Indicator 10.3 and should be used with caution in any Arctic city sustainability index.

Results and Suggested Improvements

Given the high importance of energy to Arctic communities, any set of indicators intended to assess the sustainability of Arctic cities should give considerable consideration to measuring energy security. Like Nome and Lavrentiya, many Arctic communities rely heavily on energy imports, lack connection to the larger national grid, have high energy costs, and are particularly vulnerable to energy disruptions given their geographical isolation and limited access to energy sources.

As demonstrated in this chapter, governance can play a significant role in community energy security; therefore, Arctic communities require an indicator that breaks the silo between energy and governance disciplines to more accurately assess energy security. Governance structures can help or hinder the ability of an Arctic community to be more energy secure. For example, in Lavrentiya, Russia's energy tariff structure disincentivizes commercial RES projects while the community's governance structure gives decision makers less authority over their budgets to fund such projects. In contrast, the State of Alaska has created financial structures to encourage projects that reduce the cost of electricity, in part by providing decision makers in cities like Nome with more access to RES funding.

Accounting for all indicator results, it appears that Lavrentiya is more energy secure and sustainable than Nome. However, this chapter's discussion has indicated several flaws in the ability of certain indicators to accurately measure sustainability in general as well as

energy security in particular, which compromises the validity of this final finding. No combination of ISO energy and governance indicators could measure the important relationship between energy and governance in enhancing energy security. None of the governance indicators could be applied to understand a city's level of energy security, and many of them had limitations in measuring governance more generally. Only two ISO energy indicators—total end-use energy consumption per capita (GJ/year), and percentage of total end-use energy derived from renewable sources—provided some measurements of local energy security. According to the results from the two energy security indicators, Nome performed better on renewable energy use whereas Lavrentiya was superior in energy consumption per capita. However, differences in energy and governance indicator values between Nome and Lavrentiya were often marginal, indicating a potential lack of statistical significance to definitively say if one community was more energy secure or sustainable than the other. Better energy and governance indicators are needed to improve energy security assessments on the local level.

Delving into the energy and governance narratives surrounding both communities, however, it would seem that Nome should have performed better than Lavrentiya overall. In particular, Nome's governance structure is more conducive to RES and energy efficiency investments whereas such investments prove more challenging in Lavrentiya. It is these kinds of investments that ultimately stand to move a city toward greater levels of sustainability and energy security, yet there is no way to directly measure Nome's success in this area using the ISO index. Therefore, a major finding from the indicator results and other research is that omitting the role of governance structures in energy financing fails to capture a critical element of energy security.

Based on identified indicator needs, we propose an indicator measuring the total amount of funds made available by government sources for city-level RES projects. Doing so highlights how governance mechanisms can stifle or advance RES development, which in turn impacts the state of a city's energy security. Though commercial funding opportunities can promote RES deployment, the interest in better understanding the relationship between energy and governance structures—both at the city level and between the city and higher governance levels—merits limiting this indicator to government funding sources. The results of this indicator also provide additional context for why one community might do better than another in terms of energy security, namely because of how many financial resources

different governance levels are making available to communities to invest in RES.

Nome benefits from multisource government financing mechanisms for RES projects, which has not only been instrumental in advancing greater urban energy security but also has contributed to creating a culture that encourages sustainable development. The Renewable Energy Fund was established in 2008 by the Alaska state legislature to generate heat and power through cost-effective renewable energy in order to retain money in local economies, reduce and steady energy costs, create jobs, and use local energy resources (Renewable Energy Fund 2019). In this case, state resources give Nome the ability to develop more sustainably while gaining other benefits for its citizens. The AEA is the state's energy office and is in charge of Alaskan energy program development and policy. To serve AEA's core mission to reduce Alaska's energy costs, the organization prioritizes diversifying Alaska's energy mix, investing in state infrastructure, improving energy planning and policy, and offering resources to rural communities. Through AEA grants and loans for energy infrastructure projects, Nome can access additional funding sources to invest in a greater number of sustainable energy options (AEA 2017). In principle, these government financing options for energy projects support Nome's long-term success in gaining greater energy security through sustainable development.

It is important to note that the State of Alaska is in the midst of a fiscal crisis that has severely reduced funding for AEA programs over the past few years. No new funding was awarded in 2016 and 2017 for the Renewable Energy Fund. Though $11 million was allocated for the 2018 fiscal year through the Fund (AEA 2019), it is unlikely to receive funding in 2019 due to Alaska governor Mike Dunleavy's proposed budget cut of $900 million if dividend spending is included (Brooks 2019). Slashing state spending is likely to reduce Nome's capacity to increase its energy security through greater RES deployment, at least in the short term.

In contrast, the limitations of Lavrentiya's governance structure to make RES investment indicates that its performance will remain at current levels for the foreseeable future unless regional or higher governments decide to invest in RES or conditions change to allow for external actors to profit from a RES project. Lavrentiya operates under a government structure that is dictated by regional and higher authorities. Financing and management of the energy sector is designed in such a way that Lavrentiya's local government cannot practically influence RES development as a larger effort to reform its

energy system. Real changes are possible only with the support of regional and federal authorities, as well as large state energy companies. Better financial support mechanisms could also help Lavrentiya tackle the technical challenges it faces to develop RES. Despite promising potential for wind and geothermal energy in the Chukotka District and in Lavrentiya in particular, a lack of successful experience in operating wind turbines and the high costs of exploration studies, equipment, installations, maintenance, and recycling prevents RES development at this time. Though one renewable energy project may be realized in Lavrentiya, if it is not successful current government plans that suggest using coal and diesel as fuel for heat and electricity generation will likely remain uncontested.

If the suggested indicator had been applied to Nome and Alaska over the past few years, the results would have favored Nome for the years when Renewable Energy Fund financing was available. The indicator's ability to measure fluctuations in Alaska RES funding and Russia's lack of funding options would not only show the impact of government actions on energy security, but also, by extension, inform evaluations of each community's level of sustainability.

Conclusion

Examining how Nome and Lavrentiya performed on the selected indicators showed a difference in their levels of energy security and sustainable development, but government funding policies, combined with long-term demographic trends, can also impact future decision making on approaches to energy security and sustainable development.

Opposite population trends stand to affect sustainability approaches in Nome and Lavrentiya. Nome has a growing population; barring significant advances in energy efficiency, this increase will contribute to a higher demand for energy. As Nome plans for the future, there is a greater incentive to invest in RES and other measures to lower fossil fuel consumption and reduce the economic burden that added consumption would bring. Assuming continued population growth, it is easier to make the case that RES investment today will pay off in the long run to counteract projected costs from increased energy consumption. Conversely, Lavrentiya's population is decreasing. Though a smaller population may make it easier to justify investing in smaller RES projects for the population, a smaller population may also disincentivize the government to fund alternative fuel sources

for Lavrentiya when it can continue to be served by diesel and coal. Divergent population trends may play a notable role in spurring more long-term RES in Nome and offer mixed incentives in Lavrentiya. As a result, differing population trends could, for example, bolster sustainable development in Nome while discouraging it in Lavrentiya. Examining energy security against relevant trends such as population growth can provide useful, additional context to how governance structures may promote or discourage RES investments in the future.

The different government policies shaping Nome and Lavrentiya's economic structures impact their approaches to energy security as well as overall sustainable development. Like most cities, Nome operates within a budget to provide services to its citizens and promotes economic development to support the population. Lowering energy costs through RES projects not only fuels the economy by providing more funding for citizens to spend locally, but also frees up more funding in the community's limited budget to offer other services to citizens. Nome's economic structure rewards actions that reduce expenses; in terms of energy costs, the pursuit of economic sustainability can align with environmental sustainability. Unlike Nome, Lavrentiya is not incentivized to reduce energy costs because it will not see the financial benefit of any energy savings. Instead, the value of their energy subsidy would decrease. Here it is clear how dissimilar governance approaches create differing incentive structures that influence each community's level of energy security. Stark differences in economic structuring create diverse incentives in Nome and Lavrentiya to pursue RES with consequences for the sustainable development of both.

Nome and Lavrentiya share many characteristics, but the differences in their governance structures and energy systems led to varied states of energy security. Two ISO energy indicators were found to adequately measure energy security differences between Nome and Lavrentiya while none of the ISO governance indicators informed our understanding of these energy security differences. Based on the two ISO energy security indicators, Lavrentiya and Nome reached similar levels of energy security. Recognizing the high importance of energy security to Arctic communities and the critical role that governance plays in energy decision making, Arctic communities require an indicator that simultaneously accounts for both energy and governance disciplines to more accurately assess energy security. Consequently, this chapter suggests that an indicator measuring total amount of funds made available by government sources for city-level RES projects be included in any future set of indicators for measuring the

sustainability of Arctic communities. This new, multidisciplinary indicator highlights how governance mechanisms can stifle or advance RES development which, in turn, impacts the state of a community's energy security. Finally, other factors such as population growth and government policies impacting community economic structures need to be considered when attempting to project a community's long-term approach to energy security.

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Notes

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2. ISO Energy Indicator 7.8 was omitted from this analysis.

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Part III

Extending the International Standard for Measuring Urban Sustainability

CHAPTER 6

Fate Control and Sustainability in Arctic Cities

Recasting Fate Control Indicators for Arctic Urban Communities

Andrey N. Petrov

Introduction

This chapter argues that the ISO framework for sustainable cities, which is meant to apply to all cities on the planet, does not work for the specific conditions of the Arctic.[1] The ISO's main failure is that it is does not take into account the concept of fate control and, particularly, the contribution of the Indigenous communities, which make up a prominent part of Arctic cities and define the context in which these cities exist.

Fate control is the ability to guide one's own destiny. This concept is linked to the more common term of "empowerment," the process of achieving the capacity to "make choices and then to transform those choices into desired actions and outcomes" (Alsop, Bertelsen, and Holland 2006: 10). Fate control is the outcome of empowerment. To control its fate, a community must have the capacity to make its own decisions; it must also have the resources to implement these decisions (Dahl et al. 2010). Each of these aspects, in turn, has an internal and external component: A community needs both the internal capacity and resources and a lack of external barriers to make and implement decisions. The "concrete material, social, and institutional preconditions to exert agency" are critical to empowerment (Ibrahim and Alkire 2007: 11).

Lack of collective fate control has given rise to demands for self-determination and self-government throughout the Arctic, and at different scales. Over the past several decades self-government institutions developed in many areas of the Arctic, including in Greenland, Inuvialuit, and Nunavut. Peoples of the Arctic give prime importance to fate control: the *Arctic Human Development Report* (AHDR) listed it among the three main areas that determine well-being in the Arctic (Einarsson et al. 2004).

Fate control is a key component of sustainability. First, it is a future-oriented indicator; in other words, it describes the ability of a system to determine the trajectory of its own development. Second, fate control is an integrative concept that brings together elements from social, economic, political, and cultural domains to assess the levels of freedom, democracy, power, and equity in the governance system to which a region or city belong. Sustainability is thus contingent on attaining fate control, and fate control is an unequivocal measure of sustainability.

Fate control is a complex concept. As a result, it is naturally difficult to develop a comprehensive indicator that would adequately characterize its various aspects. Few sustainability indicator frameworks seem to be able to accomplish the task of fully incorporating this element, or even acknowledging it explicitly. For example, the ISO sustainable cities governance indicators focus on voter representation, participation, and gender equality. All three are key for understanding sustainable governance, but they do not reflect the complexity and uniqueness of the Arctic governance systems. First, they are exclusively political, although economic and cultural components of fate control are also very relevant. A community's ability to pay its own bills and provide consumer power are vital for its fate control and sustainable development. Cultural vitality and the preservation of local languages are also indicators of the internal societal capacities to drive development forward in a way that satisfies the needs of community members without jeopardizing future generations. Even in the political realm, ISO governance indicators omit Indigenous governance and Indigenous community capitals (language, culture, subsistence economy, etc.), all of which are crucial for Arctic sustainability. The Arctic Social Indicators report (Larsen, Schweitzer, and Fondahl 2010) suggested a few more comprehensively designed ways to conceptualize quantitatively and measure fate control including the rather simple, but powerful, approach of looking at fate control at a community level (Dahl et al. 2010). It recommended distinguishing between four forms (components) of fate control: political control,

decision-making control, including land control, economic control (self-reliance), and control over knowledge construction (associated with overall cultural vitality, and specifically with the ability to speak a native language).

Based on these four domains, the ASI Report (Dahl et al. 2010) proposed to create a Fate Control Index (FCI) where a region (community) would be evaluated under each of the following four measures.

1. Political Control: The percentage of Indigenous members in governing bodies (municipal, community, regional) relative to the percentage of the Indigenous people in the total population. Seen in the perspective of human development, fate control should imply that none of these groups are discriminated against. This indicator measures relative political activity and power among different ethnic groups. It can be measured at the municipal, community, regional, or national level.
2. Decision-Making Control: The percentage of surface lands legally controlled by the inhabitants through public governments and native corporations. This indicator addresses political power, economic control, and decision-making power, and also has a cultural dimension. Moreover, since international conventions stipulate Indigenous rights to land, this indicator incorporates a dimension of human rights.
3. Economic Control: The percentage of public budget revenues within the region raised in the appropriate jurisdiction or the percent of self-generated income in the total local population's income. This indicator provides one measure of economic control. Without fiscal independence, a democratically elected and popular government may nevertheless have limited ability to operationalize its decisions.
4. Control over Knowledge Construction: The percentage of individuals who speak a mother tongue, whether or not that individual is native, in relation to the individuals reporting corresponding ethnicity. Language retention serves as a proxy for fate control, in terms of knowledge construction and human (and particularly Indigenous) rights.

Each component ranges from 0 (no control) to 1.0 (full control). To calculate the FCI, all four components are added together.

The concept of fate control and the FCI were applied in a number of studies and used to examine governance, human rights, and human development issues across the Arctic (e.g., Kimmel 2014; Petrov,

King, and Cavin 2015). Some relationships were identified with other human development dimensions. For example, fate control has been found to be higher in Arctic communities that exhibited a strong attachment to land and/or sea, and that demonstrated a greater level of cultural vitality (Petrov et al. 2015).

The ASI Report also developed the notion of individual fate control (Dahl et al. 2010). The idea is that community and personal ability to determine current and future affairs are different, albeit related, concepts. Individual fate control includes the same basic elements: political control, decision-making control, economic control (self-reliance), and control over knowledge construction. Although no study in the Arctic ever measured individual fate control, potential variables may include voter participation, people's satisfaction with the level of local influence on resource management, their satisfaction with their standard of living, and indicators of cultural vitality (language, museums).

This chapter presents a first-cut analysis of fate control, both community and individual, in a sample of Arctic cities. We generally follow the ASI methodology in defining the elements of fate control, but introduce substantial modifications in respect to variables measured. The main difference is that the original community-level FCI methodology was designed to target largely rural, Indigenous communities in the Arctic, hence the emphasis on such variables as control over land/sea, Indigenous language retention, and Indigenous representation in governing bodies. While completely justified in the context of the ASI project and its follow-up studies, this approach may not be directly applicable to measuring fate control in Arctic cities. Although the presence of Indigenous populations in Arctic urban areas is substantial and important, and the control over land and resources is essential, there are other indicators that could be used to tackle fate control as applied to all population groups, both Indigenous and settler communities, and reflects the reality of the urban places, which is distinct from smaller rural communities. Below, we adjust the ASI methods to account for variables relevant in the urban context and also develop a measure of the individual fate control of urban residents.

Methodology

Following the definition and general understanding of the fate control components suggested in the ASI Report (Dahl et al. 2010), this chapter creates a modified set of indicators for a small but diverse sample of

Arctic cities. We consider a combination of standard ASI and ISO indicators, mostly giving preference to ASI as being more tailored to the realities of Arctic cities. We studied twelve urban communities from Russia, Canada, the United States, Greenland, Sweden, and Norway. The selection was based on size (> 12,000 population) and regional importance (county and regional capitals). In addition, an additional consideration was geographic and functional diversity. For example, the set of Russian Arctic cities included Archangelsk (a cultural center and the largest city in the Russian Arctic), Norilsk (an old mining city) and Salekhard (a booming capital of an oil/natural gas region). The Canadian sample consisted of Yellowknife and Whitehorse. The study also incorporated the two largest cities in Alaska: Anchorage and Fairbanks, and a number of Nordic communities: Tromsø, Kiruna, Luleå and Boden, alongside Greenland's capital of Nuuk.

The definitions of the variables used to characterize the four components of fate control (political, decision-making, economic, knowledge construction at both the community and individual levels) were heavily affected by data availability across the sample (table 6.1). This was a challenge given the high variability of data collection practices and differences in the underlying social and economic contexts. For some of the data, this study relied on the earlier work by Suter et al. (2017) and Petrov (2014), who compiled circumpolar datasets for urban Arctic communities.

In this chapter the community fate control elements are measured as follows. Political control is typically quantified based as a representation of a given community in a regional government. However,

Table 6.1 | *Fate control components and variables for Arctic cities*

Fate control components	Community fate control	Individual fate control
Political control	Fraction in total regional population (electoral weight)	National elections participation rate
Decision-making control	Democracy index (National)	Per capita income adjusted for purchasing power parity
Economic control	Per capita public expenditures per $100 of per capita income adjusted for purchasing power parity	Cost of travel to the mainland as a percentage of per capita income
Control over knowledge construction	Bachelor degree or equivalent education, location quotient (national base)	Access to Internet (percent of households)

Source: Adapted from Dahl et al. 2010.

it may be challenging to define which electoral districts are representing the community and in which governing body, especially when electoral systems are very diverse. To solve this problem, this study simply used the relative population size of the community in the region, which gives the electoral weight of a city. The underlying assumption here is that, to a certain degree, the representation in the governing bodies is proportionate to population size; this assumption holds in all governance systems across the Arctic.

The decision-making power of a community can be measured in various ways. One option is to develop localized indicators based on examining local electoral process and representation. However, these measures are qualitative in nature and may be difficult to compare among jurisdictions. For example, mayors or heads of municipalities are directly elected in Anchorage, Fairbanks, Nuuk, Whitehorse, and Yellowknife. In Russia, Sweden, and Norway they are appointed by city councils, which in turn are elected by popular vote (either by party lists or individually or both). Thus, the differences in the electoral systems across the Arctic make comparisons problematic.

Another option is to use a national indicator that describes the overall level of democracy. Such an indicator would measure the availability of the democratic process for communities to participate in. In this study, the decision-making power is represented by the Democracy Index (Kekic 2007). Designed by the Economist Intelligence Unit (2017), the Democracy Index is a weighted average based on the answers to sixty questions developed by experts and public opinion surveys. The Democracy Index evaluates five categories: electoral process and pluralism, civil liberties, the functioning of government, political participation, and political culture. Every country is rated for each of those categories, and an overall score is calculated (Campbell 2008). While not an ideal or strictly scientific measure, it gives an approximate, generalized, and comparable view of the state of democracy in all Arctic jurisdictions.

Economic control is quantified through per capita public expenditures per $100 of per capita income adjusted for purchasing power parity (PPP). In other words, this measure assesses the public expenditure as compared to overall community prosperity. Standard measures, like those used in the ISO (e.g., operating and capital budgets per capita), are not particularly informative. Given a large variety of economic conditions across the Arctic, using public finances without placing them in context appears to be problematic. Therefore, normalizing municipal expenditures by income provides a more realistic picture of true community budgetary affluence. Alternative

or additional measures can be own-source revenue as a percentage of total revenues, as included in the ISO. However, this measure is heavily dependent on the national taxation system, and thus varies considerably among the Arctic countries.

Control over knowledge construction (i.e., the ability to produce, transmit and use information in a meaningful way that reflects the values and desires of a community) can be measured by the level of education of community members, assuming that higher education delivers more competencies to work with knowledge and information. In particular, this study uses the location quotient (relative share normalized by the national average) of population with a bachelor's degree or equivalent. It is a standard measure of human capital (Hirshberg and Petrov 2014; Petrov 2014). Admittedly, this measure focuses only on formal education, and undercounts informally educated human capital that is considerable in the Arctic (see also Hirshberg and Petrov 2014). Still, among the ISO measures of educational attainment, it is the most accessible in terms of data availability.

In respect to the individual fate control of urban dwellers in the Arctic, the four variables were defined as follows, taking into account indicators and available data suggested by ASI and ISO. Individual political control was expressed through participation in the latest national election (voter turnout). Presumably, the willingness to take part in an election reflects voters' perception about the importance of their vote. However, differences in political culture and systems may obscure direct comparisons between countries, and thus this parameter should be considered with caution. Its advantage is data availability and accessibility.

Decision-making power can be measured using surveys of people's satisfaction with their influence. However, since such data are not available, an alternative would be to gauge the ability to make decisions about personal affairs by looking at income. Personal control over one's life requires the presence of appropriate resources, such as money, to ensure the implementation of individual choices and decisions. This chapter uses per capita income in purchasing power parity-adjusted dollars with the assumption that higher income may lead to more control over personal affairs.

In terms of economic control, given the remote nature of most Arctic cities a key variable is the cost of travel to the mainland as a percentage of per capita income. If travel is relatively cheap, it not only leaves a considerable proportion of disposable income to be spent on other purposes, but also may indicate more-extensive opportunities for job searches, access to knowledge and financial hubs, migration, travel, and personal

leisure. Again, cheaper travel increases available resources and opportunities to make decisions and implement them. The ISO framework does not measure remoteness or costs of travel. It captures the number of flights connecting the city, but this connectedness may remain superficial if local population lack the financial resources to travel (and when most travelers are fly-in/fly-out workers and other visitors).

Knowledge construction at the individual level may be quantified through access to knowledge-sharing platforms via the Internet. Availability of the Internet has been described as an important element of the freedom of expression (Lucchi 2011). This study uses access to the Internet as the percentage of all households to characterize the knowledge construction component of personal fate control in Arctic cities. The ISO uses a similar measure: the number of Internet connections per one hundred thousand residents.

Although the original ASI methodology called for creating an FCI, it did not provide guidance on weighting the components, especially when the original variables are modified or replaced as suggested above. To simplify this task, this study uses a straightforward approach by first ranking cities based on each parameter, and then deriving an average rank to compare the overall fate control in a given urban community with its circumpolar counterparts. The four fate control elements (political control, decision-making control, economic control, and control over knowledge construction) are weighted equally to determine the final ranking in respect to community fate control and individual fate control.

Results and Discussion

The community fate control ranking for the selected Arctic cities and towns is presented in table 6.2 (overleaf). The highest-ranked urban community in the Arctic is Tromsø followed by Luleå, Yellowknife, and Boden. Notably, two of the top three cities are Scandinavian. They are relatively large and less remote than some of their counterparts in the Arctic, represent well-established democratic governance systems, and boast healthy municipal budgets. Yellowknife, the capital of the Northwest Territories, benefits from its relatively large size, educated labor force and considerable local budget expenditures. These characteristics are undoubtedly related to its role as the capital of a resource-rich region. Whitehorse, another northern primate city, demonstrates a similar ranking (table 6.2). Nuuk is well-positioned in respect to most parameters with the exception of human capital: a

relatively low proportion of labor force with higher education (compared to Denmark) drags that city down in the rankings.

On the bottom of the list are the US and Russian cities: Norilsk is the lowest ranked, followed by Fairbanks, Anchorage, and Arkhangelsk. The composition of this group is somewhat surprising given the differences between Alaskan and Russian northern urban communities. Accordingly, the reasons for being in the lowest tier differ: US cities suffer from poor budgets and a less-educated labor force, whereas Russian urban communities underperform in terms of democracy and municipal finances. The underinvestment in human and physical capital in the US Arctic cities appears to be a problem that needs to be investigated further.

The ranking for the individual fate control in Arctic urban communities follows a similar pattern (table 6.2). The highest ranks are earned by Swedish cities: Boden, Luleå, and Kiruna. Again, these are less-remote, better-connected places with broad Internet penetration and well-educated population. Voter turnout is also high (usually above 80 percent). Salekhard, the capital of the natural gas–rich Yamal-Nenets Autonomous Okrug, emerged in fourth place. This city is reasonably well connected with the mainland by air and railway, and demonstrates large per capita incomes. Salekhard, however, ranks low on Internet connectivity.

Two Russian cities, Norilsk and Arkhangelsk, are at the very bottom of the individual fate control ranking. Low voter turnout, limited Internet access, and relatively low per capita incomes are the main contributing factors. As a result, local residents face serious constraints in their ability to support their priorities and make decisions based on their best interests and desires. The low standing of Fairbanks and Yellowknife is surprising, but high travel costs compared to local income is the primary problem in these communities.

Taking both community and individual fate control rankings into consideration, it is clear that cities in northern Scandinavia perform the best, while urban settlements in the Russia Arctic lack fate control. However, this pattern is not without exceptions. The city of Salekhard is unexpectedly well positioned in the overall ranking, ahead of US cities, Canadian territorial capitals, Nuuk, and all other Russian communities. Being the capital of a booming fossil fuel region propels Salekhard to the top, but this position may change should the resource cycle enter a declining phase. In other words, the long-term fate of Salekhard (and other resource-dependent settlements) is really outside its control.

It is also notable that the large Alaskan cities, Anchorage and Fairbanks, exhibit less community fate control than other Western

Table 6.2 | *Fate control rankings for selected urban communities in the Arctic*

City	1 Fraction in total regional population	2 Bachelor degree or equivalent education, LQ	3 National democracy index	4 Per capita public expenditures per 100 dollars of per capita incomePPP	5 Cost of travel to the mainland as a percentage of per capita income	6 Per capita income (PPP)
Anchorage	0.405732	0.95	7.98	1,574.75	0.127004	36,733
Arkhangelsk	0.310872	1.38	3.17	945.59	0.105754	20,174.46
Boden	0.075195	0.96	9.39	11,535.46	0.008669	37,802.69
Fairbanks	0.130746	0.87	7.98	1,067.6	0.281004	33,553
Kiruna	0.073078	0.65	9.39	9,411.79	0.026562	37,533.63
Luleå	0.183024	1.11	9.39	11,548.68	0.008659	37,264.57
Norilsk	0.06099	0.96	3.17	3,953.66	0.126465	36,459.09
Nuuk	0.315073	0.83	9.22	10,183	0.098203	39,568.97
Salekhard	0.079366	1.5	3.17	5,223.71	0.076574	41,541.71
Tromsø	0.559197	1.25	9.87	5,144.82	0.029156	35,850.03
Whitehorse	0.686668	1.09	9.15	2,447.707	0.285982	42,510.57
Yellowknife	0.463895	1.29	9.15	3,925.756	0.152837	57,765.04

Sources: Economist Intelligence Unit 2017; Petrov 2014; Suter et al. 2017.
Note: Voter turnout is taken from miscellaneous media reports

urban settlements. The same applies to their residents who are set to exercise less control over their lives. It appears that structural problems, such as tight local budgets, high travel costs, the relatively small share of college-educated labor force, and lower voter participation, are at the core of their lack of fate control.

Fate control is not only a key social indicator related to well-being, human rights, and political empowerment (Dahl et al. 2010), but also an important characterization of governance as it relates to the ability of communities and individuals to make informed and self-beneficial choices. Sustainable development is one such choice that requires resources, freedoms, and capacities to develop in a way that serves the current generation of residents while supporting the community's future. Therefore, governance based on robust fate control is both a prerequisite for and an element of sustainability. Conversely,

7 Access to Internet	8 National elections voter turnout	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8	Mean Rank *Community FC*	Mean Rank *Individual FC*
95	60.7	4	9	8.5	10	8	1	8.5	9	7.875	6.625
66	58.2	6	2	11	12	12	11	11	7	7.750	10.250
93	85.3	10	7.5	3	2	5	4	1.5	2	5.625	3.125
94	60.7	8	10	8.5	11	11	2	8.5	11	9.375	8.125
93	82.5	11	12	3	4	6	4	4	3	7.500	4.250
93	85.3	7	5	3	1	7	4	1.5	1	4.000	3.375
67	60	12	7.5	11	7	9	10	10	8	9.375	9.250
65	74.2	5	11	5	3	4	12	6	6	6.000	7.000
70	84.2	9	1	11	5	3	9	3	5	6.500	5.000
78	74	2	4	1	6	10	8	7	4	3.250	7.250
78	76	1	6	6.5	9	2	7	5	12	5.625	6.500
91	55.2	3	3	6.5	8	1	6	12	10	5.125	7.250

a community cannot move toward sustainability if it cannot define its own future, whether in the short or the long term. Sustainable governance must incorporate conditions for strong fate control or there will be no progress toward sustainability. This applies to all levels of governance: local, regional, national, and global. External barriers represented, for example, by national political systems, could impede the ability to make and implement decisions, even if there are internal community capacities and resources.

Conclusion

This chapter applied the notion of fate control as one of the key Arctic social indicators to selected urban communities in the Arctic.

A set of variables was used to characterize both community and individual fate control using the four elements approach (political control, decision-making control, economic control, and control over knowledge construction). The indicators were applied to twelve cities located in Russia (three), Sweden (three), the United States (two), Canada (two), Norway (one), and Greenland (one). Results demonstrate that, generally, cities in northern Scandinavia perform the best, whereas urban settlements in the Russian Arctic lack fate control, with Canadian and US cities positioned in between. Structural or systemic problems, such as remoteness (and high travel costs), poor local finances, low voter turnout, and lower levels of educational attainment, heavily contribute to depressing both community and individual fate control.

Although this first-cut study of fate control in Arctic urban communities is indicative of considerable difference across the circumpolar region, more-detailed work is needed to develop indicators appropriate for remote urban communities and to link levels of fate control with other social, political, and economic factors and processes that determine the density of the cities. In particular, the association between fate control and sustainable development could be an important area of inquiry. Relating sustainability and governance via the notion of fate control is a promising approach that should be explored.

From our analysis, measuring fate control as a component of urban sustainability is attainable even given data limitations. Here we mostly used the ASI-suggested indicators, although some of them closely match the ISO framework. Still, urban fate control measures need further development, since neither the ASI nor the ISO was designed to describe the unique socioeconomic, geographic, and governance characteristics of Arctic urban communities.

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CHAPTER 7

What Do ISO Indicators Tell Us about Corporate Social Responsibility and Sustainability in Cities of the Yamal-Nenets Autonomous Okrug, Russia?

Stephanie Hitztaler and Veli-Pekka Tynkkynen

Introduction

Corporate social responsibility (CSR), broadly defined as a set of governance initiatives ensuring the betterment of workers and communities alongside a corporation's economic development (see Henry et al. 2016), holds clear potential in promoting social, economic and environmental sustainability.[1] How do current CSR programs in cities and towns in the Russian Arctic affect key ISO indicators of sustainability? How useful are these indicators in measuring the contribution of CSR to an Arctic city's overall level of sustainability? These guiding questions are addressed through an analysis of change over time in selected ISO indicators and an exploration of how they do (or do not) reflect the impact of prominent CSR programs in Arctic cities of the Yamalo-Nenets Autonomous Okrug (YNAO) in northwestern Siberia.

In this Arctic region, a palpable tension exists between the social sphere and environmental status, suggesting that CSR perspectives here may be slanted toward upholding the existing social order and

not necessarily toward sustainable development. This chapter seeks to fill the knowledge gap on the actual impact of CSR initiatives in YNAO's towns and cities. It also offers a critique of the ISO index, inquiring into whether it is a sufficient tool in measuring the sustainability outcomes of CSR programs. These insights are crucial today as large-scale, international projects aimed at hydrocarbon production are launched in the area (Gritsenko et al. 2018).

The assessment of how CSR programs are connected to the ISO index and the implications for sustainability in YNAO proceeds as follows. We first detail CSR, especially the aspects of it that are unique to Russia, and then give a background of the Russian companies that are responsible for authoring the CSR policies and programs discussed here and the specific Arctic conditions of YNAO in which these companies operate. We then look at how CSR projects influence selected ISO indicators over time, focusing on the core indicator of number of sports facilities per one hundred thousand population in the YNAO cities of Labytnangi, Nadym, and Noyabrsk. Finally, we end with a discussion of whether CSR translates into sustainability and a critique of the ISO index.

Oil, Gas, and CSR in YNAO

A Closer Look at CSR in the Russian Context

CSR is commonly defined as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (European Commission 2001). A wider view of CSR includes the recognition that companies bear a responsibility for (1) their impact on society and the natural world, (2) the actions of others with whom they do business, and (3) their relationship to both their stakeholders and the wider society in which they operate (Blowfield and Frynas 2005; Nekhodka, Kolbysheva, and V. Makoveeva 2015; Prieto-Carrón et al. 2006; Tysiachniouk et al. 2018). In sum, CSR embraces transparency, stakeholder interests, labor rights, safety, and a pledge to protect the environment (Henry et al. 2016).

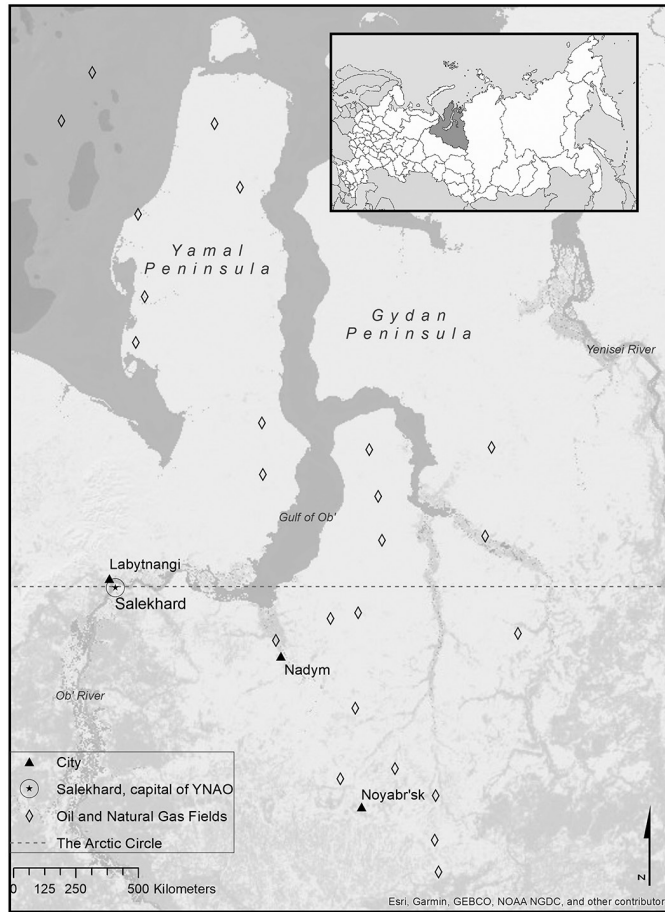
While overall descriptions of CSR generally converge on a global level, there is a distinct variation in how CSR is understood and implemented in local contexts (Henry et al. 2016). In the Russian context, CSR is relatively new and is readily distinguished by the firm role of the state in its development (Khayrullina 2017). As described by Marina Khayrullina (2017), CSR policies in Russia tend to fall in

the middle of the CSR continuum, bounded at one end by a purely business-initiated model and at the other by a solely state-initiated model. More specifically, CSR in Russia involves a limited group of stakeholders consisting of the state and company owners and employees; local communities typically have not been fully included. In terms of the CSR social-environmental continuum, focused solely on social/socio-economic issues at one end and environmental actions at the other, Russian CSR initiatives lean heavily toward the social end, tending to fall into patterns resembling the Soviet legacy of paternalist welfare provision (e.g., providing social services and building infrastructure in the local communities of operation; see Henry et al. 2016). This trend of paternalism is a hallmark of CSR policies within Russia's oil and gas sector, even as these policies have become more prominent due in part to increased competition in export markets, the necessity of attracting foreign investment, and the chance to take part in multinational consortiums on hydrocarbon development (Henry et al. 2016).

Yamal-Nenets Autonomous Okrug: A Land of Tundra, Water, and . . . the Hydrocarbon Industry

We examine the CSR policies and initiatives specific to YNAO, a region that is literally awash in hydrocarbons. To illustrate, three of the major deposits (Bovanenkovskoye, Kharasaveyskoe, and Novoportovskoye) alone hold an estimated 5.8 trillion cubic meters of natural gas, 100.2 million metric tons of gas condensate, and 227 million metric tons of oil (Gubarkov 2008, qtd. in Walker et al. 2011). Consequently, YNAO has become a pivotal region for the growth and expansion of Russia's oil and gas giants, including Gazprom, Gazprom Neft (a subsidiary of Gazprom, specializing in oil extraction), Rosneft, and Novatek (Gazprom Neft 2019a). In a country where oil and gas form the economic cornerstone (Kumpula, Forbes, and Stammler 2010; Shvarts, Pakhalov, and Knizhnikov 2016), the current surge in fossil fuel production in YNAO has elevated this region to a highly strategic position on the national and global stages, especially in terms of natural gas.

Gazprom, for instance, has established and is actively developing a center of gas extraction in YNAO from which it procures more than 90 percent of its gas, a resource critical to Russia's energy security (Gazprom 2013). Similarly, Gazprom Neft derives nearly half (47.6 percent) of its total production from its oil and gas condensate fields in YNAO (Gazprom Neft 2019a). These include the Novoportovskoye



Map 7.1 | *Cities of the Yamal-Nenets Autonomous Okrug. Map created by Claire Franco, base map source: ESRI. Published with permission.*

Field on the Yamal Peninsula, which is the northernmost onshore oilfield in Russia, and the Vostochno-Messoyakhskoye Field in northeast YNAO. Today Gazprom Neft's upswing in production is attributed in large part to these unique fields (map 7.1) (Gazprom Neft 2019a).

Overall, total hydrocarbon extraction in YNAO has risen more than threefold in terms of gross value between 2005 and 2015 (Gritsenko and Efimova 2018). Massive investments have facilitated this surge in production. In fact, 72 percent of all investments in the Russian Arctic are put into hydrocarbon projects in YNAO (Burov 2017). Moreover, major advances have been made in the technical infrastructure required to export hydrocarbons out of the frigid and

unpredictable terrains of YNAO. These advances include the Arctic Gates terminal where oil is transferred from subsea pipelines into large oil tankers, and nuclear icebreakers that cut paths in the sea ice for these tankers.

The Rise and Nature of CSR in YNAO

Massive industrialization by the oil and gas industry has brought substantial amounts of revenue into the operating budget for YNAO; it has also enabled this industry to allocate generous funding for the development and implementation of their CSR policies and projects. In the words of one Gazprom Neft executive, "Yamal is one of the most important regions for us. Therefore, we are directing considerable funding toward the building of important facilities [e.g., athletic, educational, medical] for YNAO's cities, towns and villages" (Gazprom 2013). CSR initiatives in YNAO are not one-sided; instead, they are closely interwoven into corporate-governmental partnerships. Such coordinated teamwork enables joint decision making concerning the pressing issues facing YNAO residents (Gazprom 2013).

While this phenomenon of close ties between company and government officials is pronounced in YNAO, it is, nonetheless in line with the parastatal status of Gazprom and Gazprom Neft, meaning that these companies operate under the authority of the Russian state and President Putin's rule. At the same time, they retain their status as commercial enterprises (i.e., open joint-stock companies; Tynkkynen 2016a). Below, we summarize key CSR initiatives of both Gazprom and Gazprom Neft, with an emphasis on the programs of the latter, because these have been especially instrumental in the expansion of sports infrastructure throughout YNAO, especially in urban centers.

Gazprom—For the Children

This key program demonstrates Gazprom's special devotion to the development of children and young people, and the company's acknowledgement that this new generation has great meaning for the future of Russia. The main goal of this initiative is to facilitate the balanced intellectual, spiritual, and physical development of the country's youth, primarily through sports and creative activities (Gazprom 2019). In YNAO, for example, a hockey rink in the city of Labytnangi was built through the support of this program.

Rodnye Goroda: Gazprom Neft's Flagship CSR Program

In 2012 Gazprom Neft united all of its CSR-based initiatives into one broad-scale program named Rodnye Goroda (Poznakhareva 2017). Envisioned as a departure from philanthropic-based (or more paternalistic) CSR policies, Rodnye Goroda represented a new, conceptual movement in CSR grounded in the positive transformation of the regions where Gazprom Neft operates through the development of human potential. Rodnye Goroda was also packaged as a people-driven initiative, with an emphasis on inclusivity and on the creativity of all who unite to make it a reality (Gazprom Neft 2017, 2019b).

Gazprom Neft claims that an underlying goal of Rodnye Goroda is improving the quality of people's lives, both through the support of diverse projects, and the building of modern infrastructure. Another important emphasis of Rodnye Goroda is on granting people living in Russia's peripheral regions access to some of the same kinds of opportunities (e.g., cultural, recreational) that those living in large metropolises enjoy. Thus, the program spans a wide range of interests, as evident in the main divisions of Rodnye Goroda. Those divisions are named Sports, Culture and Arts, Science and Education, Transformation of Urban Environments, Support of People with Disabilities, and Support of Indigenous Peoples of the North. In its development of Rodnye Goroda, Gazprom Neft is thought to have achieved a level of sophistication in CSR programs that is unprecedented among Russian companies (Frynas 2005; S. Orlov 2018). In YNAO the Rodnye Goroda program is actively being implemented in small, remote villages on the Yamal Peninsula (Mys Kamennyi and Novy Port) as well as in the region's larger urban areas.

Assessing the Connections between ISO Indicators and CSR Initiatives

Our approach in this assessment involved the following steps. First, we chose the following ISO indicators on the basis of their potential to gauge the effects of CSR initiatives (primarily the Rodnye Goroda program):

- Number of sports facilities per one hundred thousand population (17.1—core indicator)[2]
- Percentage of municipal budget allocated to cultural and sports facilities (17.2—supporting indicator)

- Percentage of city population living in inadequate housing (12.1—core indicator)
- Living space (square meters per person) (12.5.4—profile indicator)
- Number of personnel working in sports facilities per one hundred thousand population (Russian data).[3]

Note that these indicators represent the following divisions in the Rodnye Goroda initiative: Sports, Culture and the Arts, and Transformation of Urban Environments (namely, building of new, modern housing units). To determine change over time, we gathered data (where available) on the aforementioned indicators for the years 2012 (the inception of Rodnye Goroda), 2015, and 2018. In this analysis we focused on the YNAO cities of Labytnangi, Nadym, and Noyabrsk (table 7.1). (Note that Salekhard was left out because there were no major Rodnye Goroda projects completed during this timeframe.)

We also drew on an extensive dataset consisting of 217 news articles that spanned a three-year period (1 January 2016 to 31 December 2018).[4] These articles originated from diverse sources, ranging from regional and local newspapers to online news sites to more specialized outlets.[5] Several articles also came from the official government website of YNAO. These articles provided critical context in which to interpret the ISO data. For instance, they were instrumental in understanding the scope of specific CSR initiatives in a particular city or, more specifically, the likelihood that changes over time in an indicator could be attributed to CSR. Below, we consider each indicator individually; however, the core of our analysis centers on the ISO indicator of number of sports facilities per one hundred thousand population in each city (Labytnangi, Nadym, Noyabrsk) since we had the most conclusive data for this indicator.

17.1: Core Indicator of Number of Sports Facilities per One Hundred Thousand Population

Labytnangi: A New "Start"

"Labytnangi: The Train Does Not Go Farther," wrote Viktor Sevte in the title of his story on this small city of approximately twenty-six thousand residents (Sevte 2018). Situated across the Ob River from Salekhard, the capital city of YNAO, Labytnangi has acquired the reputation of being a dead end because it hosts the very last station on Russia's Northern Railroad. In the beginning of the 2000s,

Table 7.1 | *Selected ISO indicators for the cities of Labytnangi, Nadym, and Noyabrsk*

City	17.1 Number of sports facilities per 100,00 population (core indicator)	17.2 Percentage of municipal budget allocated to cultural and sports facilities (supporting indicator)	12.1 Percentage of city population living in inadequate housing (core indicator)	12.5.4 Living space (m^2 per person) (profile indicator)	Number of personnel in sports facilities per 100,000 population (Russian data)
2012					
Labytnangi	120.43	4.68	0.48	20.94	1,072.56
Nadym	116.13	no data	0.20	no data	1,138.10
Noyabrsk	171.19	5.99	0.61	18.30	956.64
2015					
Labytnangi	124.30	6.14	0.51	21.50	1,069.70
Nadym	no data	9.31	1.36	no data	no data
Noyabrsk	189.49	8.58	0.50	20.00	984.80
2018					
Labytnangi	183.75	6.61	0.71	21.60	no data
Nadym	163.70	6.13	0.69	no data	no data
Noyabrsk	221.64	9.89	0.31	19.20	no data

Source: Russian Federal State Statistic Service Database of Municipality Indicators.

the Obskaya-Bovanenko railroad line was built, turning the Obskaya station just outside Labytnangi into a transshipment facility through which cargo and shift workers are transported year-round to the gas and oil fields in the Yamal Peninsula. Thus, while Labytnangi itself is not a site of oil and gas extraction, or the base of hydrocarbon companies, it nonetheless serves as an important transportation hub for the industry. Thanks to the flourishing of this industry throughout YNAO (particularly on the Yamal Peninsula), the city has seen substantial improvements in its infrastructure since 2013. These include new daycare and other centers for children, road repairs, reconstruction of the waste-water treatment facility, along with a general clean-up of littered areas ("V Labytnangi v 2018 godu planiruyut postroit' neskol'ko znachimikh ob'ektov" 2018; Zainullina 2017).

No doubt, however, the most prominent additions in the city have been the new outdoor and indoor sports facilities. The number of sports facilities per one hundred thousand population (ISO indicator 17.1) increased slightly from 2012 to 2015 (table 7.1). This occurrence was most likely explained by the completion of a new outdoor soccer stadium in the center of Labytnangi in September 2013, which was financed in part by the Gazprom subsidiary, Gazpromtrans (specializing in the movement of freight) ("Novyi stadion poyavitsya v tsentre Labytnangi" 2013). Although at that time there was a youth sports school (*sportivnaya shkola "Yunost"*) in the city dedicated to developing a culture of physical fitness and sports for all, this new sports field was the only one of its kind in Labytnangi and stood to become the focal point of athletic activity for people of all ages ("Novyi stadion poyavitsya v tsentre Labytnangi" 2013).

This project proved to be just the beginning of what looks like an athletic revival in Labytnangi. Through citizen initiative and funding from Gazpromtrans, a multipurpose outdoor recreational center was envisioned and built in the city center ("Po pros'bam trudyashchikhsya: Labytnangi golosuet za sport" 2017; Zainullina 2017). Opened in Fall 2017, this large, new addition to the city's sports infrastructure appears to be reflected well in the ISO indicator 17.1, which grew by 32 percent in just three years, from 2015 to 2018. By popular vote the center was named Start ("Na 'Start,' vnimanie, marsh! V Labytnangi otkryli novyi sportivnyi tsentr" 2017), which is symbolic since the high-caliber center, complete with an all-weather regulation track, various sports courts, a skate and bike park, and playgrounds, to name just a few of the amenities, provides an opportunity for all in the city—small children, teenagers, and adults alike—to take new steps toward becoming more physically

active. This center also represents a start in promoting familial and community cohesion.

Besides all the amenities listed above, this recreational center also has a training area specifically designed for the Russia-wide program entitled Ready for Labor and Defense (Gotov k Trudu i Oborone [GTO]), which specifies norms for physical training with the overall intent of developing popular sports and improving the nation's health. The focus on this program highlights the Russian state's tangible presence in this remote northern corner of the country. Moreover, the recreational center as a whole was part of a country-wide initiative, Formation of Comfortable and Modern Urban Environments, which the Russian state has declared a top national priority. ("Na 'Start,' vnimanie, marsh! V Labytnangi otkryli novyi sportivnyi tsentr" 2017). The funding for this complex, however, has been largely corporate. Gazpromtrans, through its CSR program, provided the additional financial support to make the many parts of this multipurpose center a reality (Labytnangi City Administration 2017, "V Labytnangakh stroyat srazu dva sportivnykh kompleksa i ledovyi kort" 2017). But both the state and the corporations take credit for its popularity. The success of this center is hard to exaggerate: Professional athletes and trainers, as well as city residents all give it high acclaim. Additionally, in 2017 this center was included in a highly selective list in the federal register of best practices in the implementation of the program Formation of Comfortable and Modern Urban Environments (Labytnangi City Administration 2018a).

Rather than the end aim, the Start complex is, in fact, a stepping-stone toward a more physically fit and engaged public, and toward urban renewal. Even before this complex was fully completed, construction on two other major athletic facilities alongside Start was already underway. This latest stage in development complements the outdoor center by providing vast indoor spaces for athletics and fitness. For instance, the immense, three-story sports and fitness complex with an area of 7,400 square meters (m^2) (79,653 square feet [ft^2]) features a multipurpose athletic hall for basketball, volleyball, and tennis; and a six-lane swimming pool. Additionally, a spacious indoor ice arena with an area of 5,482 square meters (m^2) (59,008 square feet) accommodates hockey, figure skating and open skating with bleacher seating for up to 400 spectators ("V Labytnangakh postroyat sportivno-ozdorovitel'nyi kompleks" 2016; "V Labytnangakh stroyat zhil'e i sotsial'nye ob'ekty" 2016; YNAO Administration 2017a). The sports and fitness center also includes bleachers for up to 345 spectators; both places also house weight and workout rooms

and smaller gym space (e.g., for rhythmic gymnastics). Accordingly, each facility is furnished with the latest equipment and, notably, each was designed to accommodate less-mobile segments of the city's population ("V Labytnangakh postroyat sportivno-ozdorovitel'nyi kompleks" 2016).

These impressive facilities, especially given the relatively small population size of Labytnangi, were built by Gazprom Neft through its Rodnye Goroda program. This program has also provided support to create in Labytnangi a local chapter of the national youth hockey league, Avangard (YNAO Administration 2016a). Although the Rodnye Goroda program is technically meant to help raise the quality of life in the cities and towns where Gazprom Neft operates, this program was nonetheless extended to Labytnangi, where the company is not based, on the initiative of the former governor of YNAO, Dmitry Kobylkin, who sought support for the integrated development of social infrastructure in Labytnangi ("V Labytnangakh stroyat zhil'e i sotsial'nye ob'ekty" 2016; YNAO Administration 2016b). Such arrangements are viewed as mutually beneficial partnerships between the state and corporations (Burov 2017).

Still, the process of constructing these facilities in Labytnangi has been much more protracted than initially expected, perhaps due to the sheer size of the project. Initially, both buildings were expected to be fully ready by the end of 2017 ("V Labytnangakh stroyat srazu dva sportivnykh kompleksa i ledovyi kort" 2017). When this timeframe was exceeded, the pace of construction was stepped up with a new projected end date set for early September (ice arena) and December 2018 (sport-fitness complex) (A. Orlov 2018; Labytnangi City Administration 2018b). This month, however, came and went without any grand opening of either facility. No specific reason was cited; perhaps, the initial frameworks for completion were simply not compatible with the scope of these projects. While the official opening of the sports-fitness complex is still forthcoming as of this writing, the ice arena, named Avangard, was completed in early Fall 2019, becoming the fourth such ice arena built by Gazprom Neft in YNAO. Its grand opening was held on 6 September 2019, on the eve of the annual day commemorating the city.

This remarkable facility of Olympic quality was presented to the residents of Labytnangi as an "excellent gift" made possible by Gazpromneft through its Rodnye Goroda program ("V Labytnangi otkrylsya novyi ledovyi kort 'Avangard' "2019), which seems to run entirely counter to the novel people-driven approach supposedly distinguishing this program from other CSR initiatives. Dmitry Artyukhov,

the new governor of YNAO who was appointed in September 2018, reinforces this top-down CSR approach:

> "Labytnangi is actively developing. There are an increasing number of sports facilities in the city and this infrastructure is due in large part to our strategic partnerships. The new ice arena is an excellent example of such partnerships. Labytnangi now has world-class facilities where young hockey players and figure skaters can train year-round, and where families here can enjoy active leisure time. I want to thank *Gazprom Neft* for their CSR program and policies." (Artyukhov quoted in "V Labytnangi otkrylsya novyi ledovyi kort 'Avangard' " 2019)

Due to the approximately two-year delay of the opening of the ice arena and sports-fitness complex, it is difficult to ascertain whether these facilities were included in the data used to determine the core ISO indicator 17.1 (i.e., number of sports facilities per hundred thousand population) in 2018, or if that rise was due primarily to the construction of the outdoor Start complex. The important point to underscore here is that this specific indicator captures the major CSR contributions in Labytnangi well.

Nadym: Site of a Broadening Sports Culture

Roughly twice the size of Labytnangi, with a population of approximately forty-five thousand, Nadym is home to the Gazprom subsidiary, Gazprom Dobycha Nadym (Gazprom Extraction Nadym) as well as to a branch of the hydrocarbon company, Novatek. Thus, unlike Labytnangi, Nadym, which is situated about 300 kilometers (km) southeast of Salekhard on the shore of the Yantarnoe Lake near the Nadym River, is recognized as an oil and gas city. At the same time, these two cities shared a similar trajectory of growth in the ISO core indicator 17.1 from 2012 to 2018. In Nadym this indicator increased by 29 percent during this period. We examine the rise of sports infrastructure in this city that has materialized as the direct result of CSR initiatives, primarily the Rodnye Goroda program. Besides infrastructure development, these initiatives have also facilitated the spread of a sports and fitness culture in the city ("V Nadyme otkryli novyi futbol'nyi stadion i khokkeinyi kort" 2016).

Through the Rodnye Goroda program, Gazprom Neft Muravlenko (a subsidiary of Gazprom Neft) through a long-term agreement with the administration of the Nadym District, has built two prominent sports facilities in Nadym. Officially opened on 9 September 2016, one of these places is a modern soccer stadium equipped with artificial turf, an electronic scoreboard, outdoor lighting, and handicap-accessible

stands accommodating up to 460 spectators. Due to the innovative drainage system, this stadium may also serve as an outdoor hockey rink in the winter ("V Nadyme otkryli novyi futbol'nyi stadion i khokkeinyi kort" 2016). The second facility in another area of Nadym, which opened on the same day, is a multipurpose sports venue that serves as an outdoor hockey rink in the winter, and as an area for soccer and volleyball in the summer, thanks to its covering of energy-absorbent and wear-resistant artificial turf ("Pri podderzhke 'Gazprom nefti' v Nadyme vozvedeno dva sportivnykh ob'ekta" 2016). Heated changing rooms adjoin the rink.

Because both of these major athletic additions to the city were opened in 2016, we assume that the bulk of the increase observed in the ISO indicator 17.1 occurred between 2015 and 2018; there were no available data for 2015. As in the case of Labytnangi, this indicator appears to express well the contribution of CSR initiatives to the city of Nadym. This message of corporate support in urban YNAO is further and consistently supported in the media and online. For instance, on the official site of the regional government in Salekhard, there are clear statements of how corporate support—in this case, of Gazprom Neft Muravlenko—acts as an outstanding addition to Nadym's athletic infrastructure ("V Nadyme otkryli novyi futbol'nyi stadion i khokkeinyi kort 2016). Interestingly, just as in Labytnangi, the appearance of new sports facilities was viewed as a valuable gift that also happened to be given on the day commemorating the city of Nadym ("Dlya futbola i khokkeya" 2016).

Noyabrsk: Home of the First Major Sports and Fitness Center Built by Gazprom Neft

Like Nadym, Noyabrsk is also an oil and gas city, founded alongside hydrocarbon development in the southernmost part of YNAO and the northern part of the Khanty-Mansi Autonomous Okrug. Today, it is home to branches of both Gazprom (Gazprom Dobycha Noyabrsk) and Gazprom Neft (Gazprom Neft-Noyabrskneftegaz). With an official population of approximately one hundred and five thousand people, Noyabrsk is the second-most-populous city in YNAO, behind Novy Urengoy. The story of sports development here mirrors that in both Labytnangi and Nadym: namely, there was a steady rise in the indicator 17.1 over time, specifically from 2012 to 2015. It is interesting to note that already in 2012 the data for this indicator were much higher than in the other two cities. This finding is most probably attributed to the opening at the end of 2012 of the first large sports center of its kind in YNAO, which was completed under the Rodnye Goroda

initiative. This sports center, visited by up to fifteen hundred people per day, offers a wide variety of sports for all ages and abilities; it also has features for adaptive sports ("Noyabr'skii 'Zenit' stal bol'she chem sportkompleksom" 2017). At the five-year commemoration of this facility named Zenith (Zenit), it was recognized that this focal point of city life has become much more than a sports complex, serving as a valuable cultural center within the city that can accommodate concerts, meetings, and conferences ("Noyabr'skii 'Zenit' stal bol'she chem sportkompleksom" 2017).

From 2012 to 2015 there was a fairly modest increase in indicator 17.1 of 10 percent, probably owing to the completion of the ice arena Avangard in December 2015. This arena with an area of 7,500 square meters (m^2) (80,729 square feet [ft^2]) features a hall for choreography, a weight-training room, and space for conferences, in addition to the ice rink. It was also funded through the Rodnye Goroda program; similar to the fanfare of arena grand openings to follow, this arena was presented as a valuable gift to the residents of Noyabrsk ("Dobro pozhalovat' v 'Avangard!'" 2015). Furthermore, from 2015 to 2018 there was a somewhat larger increase of 15 percent in this indicator due to the completion of two more projects sponsored through Rodnye Goroda.

The first project was a new sports complex completed in 2016 and situated in the farther suburbs of Noyabrsk. As in Labytnangi and Nadym, the grand opening of this facility coincided with a holiday, the Day of Workers in the Oil and Gas Industry, and was presented as a "real" gift for the people of Noyabrsk (YNAO Administration 2016a). This new facility of more than 3,500 square meters (m^2) (37,674 square feet [ft^2]) included sports halls, weight rooms, a swimming pool, and a medical unit. It was also designed to adapt to the fitness needs of people with handicaps.

Besides these immediate amenities, this center more broadly empowered people by providing access to a resource that they did not have previously. Consider this statement by former governor Kobylkin: "This new sports center allows for radical improvement in opportunities to pursue sports in a more remote section of the city where there were no modern sports facilities up to the building of this new facility" (YNAO Administration 2016a). Furthermore, this center, like the others before and after it, was built on joint corporate-state agreements, and served the larger purpose of popularizing a healthy lifestyle and a striving for victory in competitive sports in YNAO (YNAO Administration 2016a). Finally, another CSR project in Noyabrsk that could have helped nudge indicator 17.1 higher was

the addition of two outdoor fitness squares with equipment. One adjoined the Avangard ice arena, while the other was next to a youth center ("V Noyabr'ske poyavitsya eshche odna ploshchka s ulichnymi trenazherami" 2016).

17.2: Supporting Indicator: Percentage of Municipal Budget Allocated to Cultural and Sports Facilities

With the exception of the city of Nadym, this indicator rose modestly over the period 2012 to 2018 for the other two cities, with the greatest increase observed in the city of Noyabrsk. This greater funding may be explained by general budget increases, especially as hydrocarbon revenue surged in YNAO. Increased municipal budgeting in this category was also likely due to the costs associated with supplying massive athletic complexes with electricity, heat, water, and wastewater disposal systems. In Labytnangi, for instance, the responsibility to connect new facilities to existing city infrastructure was included in the agreement with Gazprom Neft ("V Labytnangakh postroyat sportivno-ozdorovitel'nyi kompleks" 2016). Moreover, the city bore responsibility for the building of new infrastructure (e.g., roads) necessary to accommodate the new buildings financed by Gazprom Neft. Officials of the administration of Labytnangi have taken this obligation seriously because they want to continue to attract investment in their city ("V Labytnangakh postroyat sportivno-ozdorovitel'nyi kompleks" 2016). In this respect, a larger increase in the municipal budget would be expected. It is possible that these additional services provided by the city are reflected in another indicator, or that they simply are left out of the ISO index.

12.1: Core Indicator: Percentage of City Population Living in Inadequate Housing and 12.5.4: Profile Indicator: Living Space (square meters [m²]) per Person

The linearity between new CSR-sponsored athletic facilities and an increase in indicator 17.1, and to a lesser degree in 17.2, was not observed in the housing indicators 12.1 and 12.5.4. The direct association between CSR initiatives and change over time in housing indicators was more difficult to identify in the ISO index. Gazprom Neft does construct new housing for residents through its Rodnye Goroda program, literally giving people the keys to new apartments in some cases so that they can move out of substandard housing ("V Sele Novyi Port dvadtsat' odna sem'ya poluchila klyuchi ot novykh kvartir"

2016). Such programs, however, have typically taken place in smaller and more economically depressed villages with large Indigenous populations (e.g., Mys Kamennyi and Novy Port) on the Yamal Peninsula where Gazprom Neft's presence is especially prominent (Gazprom Neft 2016a; "V Novom Portu neftyaniki pomogli postroit' chetvertyi mnogokvartirnyi dom" 2017). In the case of the three cities that this chapter discusses, CSR initiatives have not typically been directed toward new housing projects (YNAO Administration 2016c). Data for the housing indicators listed above over the period 2012–18 for each city simply are not conclusive (table 7.1), thus precluding any firm assertions.

Indicator of Number of Personnel Working in Sports Facilities Per One Hundred Thousand Population

There were simply not enough data to make a conclusive statement regarding the utility of this indicator in capturing the effect of CSR initiatives on sustainability within an urban area in YNAO. Also, it should be noted that even if we would have been able to obtain better data, including those for the number of personnel working in cultural institutions, it is unlikely that this indicator would have been helpful in measuring the impact of CSR programs. While these programs, particularly Rodnye Goroda, allocate considerable funding for support of the arts and culture, many events in this category are annual and do not necessitate a permanent staff. One example is the widely acclaimed street art festival Steinograffia, which features professional graffiti artists who transform the sides of apartment buildings and garages into striking and colorful murals. In addition to Steinograffia, the Rodnye Goroda program has supported other festivals, such as Where Art Is Born (Gde Rozhdaetsya Iskusstvo) and, most recently, Breath of the Arctic (Dykhanie Arktiki). These programs represent a recent and growing effort to shift attention somewhat from the dominant sports sphere to the arts ("V Noyabr'ske i Muravlenko pri podderzhke 'Gazprom nefti' vpervye proshel Vserossiiskii festival 'Gde rozhdaetsya iskusstvo'" 2017).

Does CSR Translate into Sustainability?

At the beginning of this chapter we asked how CSR initiatives influence core and profile indicators in the ISO index. Our assessment revealed that the ISO core indicator of the number of sports facilities

per one hundred thousand population was the best measure of CSR programs, particularly that of Rodnye Goroda, in YNAO. Because the urban areas we examined in this chapter were small, especially Labytnangi and Nadym, and because in YNAO the CSR programs are essentially the sole means of support for major sports projects, it was straightforward to connect jumps in this core indicator to an increased impact of CSR. The other ISO indicators we considered were not as effective in showing the outcomes of CSR programs, which in this case was explained in part by the nature of the CSR initiatives themselves, specifically where their investments were focused. Also, a variety of issues may factor into these indicators, making it difficult to determine the extent of the CSR influence. Some ISO indicators were suitable for our assessment (e.g., square meters of public outdoor and indoor recreation space per capita), yet there were simply no data available at the city level. Nonetheless, at least one core indicator was successful in capturing the considerable impact of CSR-sponsored sports facilities in YNAO. Yet, what do these indicators that are part of an index that is meant to assess sustainability actually tell us about sustainability in YNAO's urban areas? Can we extend the connection from CSR to ISO indicators to an outcome of sustainability? In other words, does the rise we observed in an ISO core indicator also mean an increased level of sustainability in a city, particularly social sustainability in this case?

At least in theory, the idea of social sustainability appears to drive the vision of Rodnye Goroda as a forward-looking program dedicated to the development of human capital (S. Orlov 2018). Moreover, the spread of athleticism and popularization of physical fitness in YNAO through the Rodnye Goroda initiative would indeed appear to be an impressive stride in people's well-being and their potential for further development. Yet here we must take a careful and more nuanced look at the highly dynamic and paradoxical political, cultural, and ecological contexts of YNAO (see Tynkkynen 2018) to grasp more fully what the ISO indicators are, or are not, telling us. To begin, we contemplate YNAO through the lens of the Russian state whose status as a great power is bolstered by high levels of oil and gas output; thus, the abundance of hydrocarbons and a steadily rising output of gas and oil from this region are equated with increasing power (Tynkkynen 2018).

What is seen as empowering, however, also has the real potential to be impoverishing. In this sense we encounter a local Arctic paradox where a huge influx of funds has noticeably raised living standards today, yet strategies for the eventual post-fossil-fuel-production period are nonexistent. Although predominantly based in the political

economy, this Russian Arctic paradox is also shaped through cultural practices and identity, especially those related to what has become a firmly entrenched dependence on hydrocarbons. Reflecting the state's priorities, fossil fuel giants, such as Gazprom, have helped embed a deep national sense of hydrocarbon attachment, emphasizing it as a clear reinforcement of Russia's status as a Great Power (Tynkkynen 2016a, 2016b).

Aligning national identity so closely to the hydrocarbon state has effectively precluded any real vision of society in a post production scenario. Thus, cultural practices and identity, similar to Arctic economies, are propped up by the oil and gas industry for now, even as long-term socioeconomic prognoses remain wholly uncertain. The question of the natural environment also fits into this equation of short-term benefit at the expense of a sustainable future, further strengthening the Russian Arctic paradox that has emerged at the hand of the political economy, and the cultural practices and identity linked to this economy.

This broad overview of the larger contexts in which major fossil fuel players, like Gazprom and Gazprom Neft, operate exposes the considerable power that these companies wield in YNAO. Such status undoubtedly dictates how CSR initiatives like Rodnye Goroda are authored and put into practice, which is namely in ways that maximize gains for the company, and for those who back CSR programs in the state (Tynkkynen 2016a). This corporate-state interplay is evidenced in the numerous socioeconomic agreements drawn up between the two sides. In this light, the immense state support of and corporate investment in athletic infrastructure throughout YNAO, where there are currently eighteen major sports facilities under construction ("V Labytnangi otkrylsya novyi ledovyi kort 'Avangard'" 2019), begins to make sense in a new way as articulated below.

Ready for Labor and Defense: Fostering a Culture of Physical Fitness and Strength

"Physical fitness and sports—they are among the most important spheres of public activity. The main aim is the comprehensive and balanced development of an individual, who is then able to make a contribution to society thanks to many years of effective professional and personal activity" ("O Yunosti" n.d.). These words introduce a school entirely dedicated to the athletic development and physical fitness of young people in the city of Labytnangi. They encapsulate a sentiment that is becoming widespread throughout urban and rural

YNAO alike. For instance, at one grand opening celebrating a new athletic facility one corporate official began his remarks with the following: "Healthy people are so essential for us. They are needed to build our beautiful city, and to develop our homeland of Russia" ("Novyi stadion poyavitsya v tsentre Labytnangi" 2013).

This ideal of a healthy, fit person as elemental in nation-building, as well as nation-defending, lies at the core of the previously mentioned Russia-wide program, Ready for Labor and Defense (Gotov k Trudu i Oborone [GTO]). The specially designated training sites for this program within some of the corporate-funded athletic facilities in YNAO are a clear demonstration of how the state relies on, and ultimately benefits from, the CSR programs that are funding the sportification of YNAO. This tight link between the state and CSR policies is elaborated on by former governor Kobylkin: "Today YNAO is one of the youngest and most athletic regions in Russia. It is heartening that more than a third of our region's population is regularly involved in sports and other forms of physical fitness, and that the Ready for Labor and Defense program is being implemented within our municipalities. Our future includes the development of modern athletic infrastructure, and the advancement of the value in leading a healthy lifestyle in the Arctic" (Kobylkin quoted in YNAO Administration 2017b).

(More) Power to the Companies

Considering the rapid expansion of large sports facilities, swimming pools, and ice arenas throughout YNAO today, it appears that Gazprom Neft has remained loyal to the "highly visible and spatially extensive social responsibility projects in the sphere of sports" (Tynkkynen 2016b: 81). At the same time, it has honored a primary intent of Rodnye Goroda, which is to provide people who live in small, remote cities and towns, with the same opportunities as those living in large metro areas. The latest Avangard ice arena built by Gazprom Neft in Labytnangi epitomizes this main aim of the company's CSR policies: the people in this tiny and (sometimes almost inaccessible) city of twenty-seven thousand now have access to vast, Olympic-quality facilities. Nonetheless, this type of investment serves the vitally important purpose of greatly elevating Gazprom Neft's image and status in YNAO, which ultimately serves to consolidate the company's power in this region.

Corporate power is further strengthened by pitching grandiose sports facilities as valuable gifts for the people. In this sense, CSR resembles a tribute that the company grants to the people (see Frynas

2005; Tysiachniouk et al. 2018). Such tributes or gifts from the outside do not instill a sense of ownership among the local people. According to Jedrzej George Frynas (2005), projects introduced in this way cannot continue to function without steady support from the outside, which contradicts a basic principle of sustainable development. Here we return to the questions posed at the beginning of this section on the links among the ISO indicators, CSR policies and social sustainability. While a core ISO indicator shows positive growth, our analysis of the context in which these CSR policies are made and implemented reveals a situation that is inherently unsustainable for the people, as well as for the economy and ecology of this place.

Conclusion

Our analysis of the relationship among the ISO indicators, CSR initiatives and sustainability underscored key points that are also helpful in understanding the overall utility of the ISO index in measuring economic, social, and environmental sustainability in the Arctic urban areas, especially those in the Russian Arctic. Most importantly, when addressing sustainability in a systematic way, it is vital to understand the bigger issues surrounding sustainability before we start measuring the details. Specifically, case studies in which empirical data are gathered, or at the very least a thorough contextualization of an Arctic city, are a must. By not taking into account social, political, cultural, and environmental realities, the ISO index can give a highly misleading picture of a city's sustainability outcomes. This chapter, for instance, revealed that while some ISO indicators did reflect the impact of CSR programs in a city, these programs did not in fact translate into a higher level of social sustainability in the city due to a host of political, cultural, and economic features unique to the region. Another clear drawback of the index is that some key aspects of sustainability (e.g., people's attitudes) are difficult to capture quantitatively. And, finally, in the Russian context the quantitative, statistical data that could be helpful in an index can be challenging to collect at the city level. Even when these data are accessible, their accuracy is often an issue.

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Notes

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2. This indicator number is technically the number of sporting facilities and cultural institutions per one hundred thousand population; however, we are working with the data for just the number of sporting facilities.
3. This indicator is not included in ISO 37120, but we are using it as a proxy since Russia's state statistical agency provides data for it. It should be noted that we had to exclude other highly relevant indicators because there simply were no data available for the Russian cities. These indicators included annual number of cultural events (e.g., exhibitions, festivals, concerts) per one hundred thousand population (17.3 supporting indicator); and public indoor and outdoor recreation space (m^2) per capita (14.1 and 14.2 supporting indicators).
4. We gathered most of these articles through the Integrum Profi database, which offers the world's largest archive of mass media pertaining to Russia and the Former Soviet Union (FSU). We searched for sources using the following query: "Rodnye goroda," "Gazprom Neft," and "Yamal."
5. Examples of regional newspapers included: *Vremya Yamala* (Yamal Time), *Argumenty i Fakty—Yamal* (Arguments and Facts—Yamal) and *Sever Press—Novosti Yamala* (Northern Press Informational Agency—News of the Yamal Region). Examples of local newspapers included: *Krasnyi Sever—Salekhard* (Red North—Salekhard), *Rabochii Nadym* (Working Nadym), and *Nash gorod Muravlenko* (Our city Muravlenko). Online news sites included nakanune.ru, vslukh.ru, and ura.ru; and more specialized information outlets included EnergyLand.info and Neftegaz.ru.

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CHAPTER 8

Planning for Sustainability

The Russian Case

Alexander Sergunin

Introduction

In its current format, the ISO 37120 (all references to ISO 37120 are to the 2018 version) as described in this book's Introduction does not include a component that measures how well a city engages in the process of planning for sustainability.[1] The lack of a planning component is a major oversight of the international standard. This chapter lays out a description of what a sustainability process might look like and examines how it works in several Russian Arctic cities.

The public administration and management sciences instruct us that planning is the process of thinking about the activities required to achieve a desired goal. It involves the creation and maintenance of a plan as well as of implementation procedures and feedback mechanisms. Planning has a specific process and requires special skills from people and institutions involved in these kinds of managerial activities. In each field, there are different types of plans that help economic, social, and political actors to achieve efficiency and effectiveness.

An important, albeit often ignored, aspect of planning is its relationship with forecasting. Forecasting can be described as predicting what the future will look like, whereas planning predicts what the future should look like for multiple scenarios. Planning combines forecasting with preparation of scenarios and how to react to them.

Planning is one of the most important project management and time management techniques. Planning sets up concrete priorities

for specific policies as well as strategic and tactical goals for a policymaker. Establishing a system of indicators to measure the progress and outcomes of policies and projects is an important function of planning as well. Planning is also preparing a sequence of action steps to achieve some specific goal. A person or institution that plans effectively can reduce considerably the necessary time and effort for achieving the goal.

In other words, a plan is like a map. When following a plan, planners can see how far they have progressed toward their project goal and how far they are from their destination.

Planning is an integral part of any urban development strategy, including for Russian Arctic cities and towns. City administrators understand that planning gives more power over the future. Planning is deciding in advance what to do, how to do it, when to do it, and who should do it. This bridges the gap between where the city is to where it wants to be. The planning function involves establishing goals and arranging them in logical order. Well-planned cities achieve goals faster than cities that do not plan before implementing their development strategies.

Planning is especially important for designing a proper urban sustainable development (SD) strategy because the latter requires an integrated approach to the developmental policies where all aspects of such a strategy—economic, social, and environmental—should be harmonized and coordinated. Planning is also important because all potential stakeholders—municipal, regional, and federal authorities; companies; universities; and civil society institutions and NGOs—should be involved in the SD strategy formulation and implementation in order to make such strategies efficient and feasible.

The main research objective of this chapter is to examine how SD strategy planning is organized in the industrialized centers of the Arctic Zone of the Russian Federation (AZRF). There are four specific purposes for this analysis: The first purpose is to find out whether the SD concept is incorporated into the municipal developmental plans and whether it is a real priority for the local government and communities. The second purpose is to examine which governmental and societal institutions are involved in the policy-planning process and whether this process is transparent and open to public discussions. The third purpose is to understand which dimensions of the SD strategies—economic, social, or ecological—are prioritized in the AZRF urban development plans. Finally, the fourth purpose is to explore whether these policies are of a short-term or single-issue character or whether they represent forward-looking strategies that

are conducive to the sustainable socioeconomic and environmental development of the northern urban areas and really can improve the situation with human and societal security in the AZRF towns. The content of the study draws on several AZRF cities and towns: Arkhangelsk, Murmansk, Monchegorsk, Nickel, Norilsk, Salekhard, Severodvinsk, and Vorkuta.

Theoretical Framework

Urban planning is part of any urban development strategy. It is considered an interdisciplinary field that includes social, engineering, and design sciences. Urban planning guides orderly development in urban and suburban areas. Although predominantly concerned with the planning of settlements and communities, urban planning is also responsible for the planning and development of water use, resources, and parks; and the conservation of areas of natural environmental significance (van Assche et al. 2013). Experts in urban planning are concerned with research and analysis, strategic thinking, architecture, urban design, public consultation, policy recommendations, implementation, and management. Urban planners work with the related fields of architecture, landscape architecture, civil engineering, the public, and business administration to achieve strategic, policy, and sustainability goals. Today urban planning is a separate, independent professional discipline. This discipline is a rather broad field that includes different subfields such as land-use planning, zoning, economic development, transportation planning, environmental planning, societal and human security, and ethnographic and cultural studies, among others (Taylor 2007).

Planning theory is the body of scientific concepts, definitions, behavioral relationships, and assumptions on urban development. According to Whittemore (2015: 77–78), there are eight procedural theories of planning: the rational-comprehensive approach, the incremental approach, the transactive approach, the communicative approach, the advocacy approach, the equity approach, the radical approach, and the humanist or phenomenological approach. Of these eight approaches, three of them—the rational-comprehensive, advocacy, and humanist or phenomenological approaches—are best suited for explaining the AZRF situation.

The proponents of the rational-comprehensive model argue that problem definition is the territory of expert planners who judge the alternatives and actions required to meet desired ends. Qualities of

the rational-comprehensive planner, known as the technician, include neutrality to politics, and a dependence on problem solving via technical information (Forester 1982). The substantive complement to this theory of planning procedure is the systems approach. The view of cities as systems entails manipulating mechanistic movements of people, goods, services, and capital between function-defined locations to achieve greater choice (Clavel 1986; Faludi 1973). Such a technocratic approach dominates AZRF urban planning because all levels of the Russian government—local, regional, and federal—operate on the assumption that only experts/specialists have the relevant knowledge and skills to produce a proper urban SD strategy.

An advocacy theory of planning expects planners to use their knowledge and power to advance the cause of a specific actor or actors (Davidoff 1965; Kurtz 1970). Decision makers take up planning from the perspectives of many governments, community groups, and other entities. This perspective could make for a more pluralistic discussion than in the case of the rational-comprehensive model. Given a variety of actors in the AZRF cities—governments, companies, military, Indigenous peoples, trade unions, NGOs—the municipal planners try to take into account those actors' interests by integrating their needs into urban development plans and involving them in both the policy-planning and implementation processes.

A humanist or phenomenological theory of planning stresses the unique ways that different groups come to possess knowledge (including, for example, the traditional knowledge of the Indigenous peoples of the North), while acknowledging the difficulty with which one group's knowledge can be translated for others, given the diversity of human experiences and perspectives (Reich 1975; Schön 1983). This theory challenges the merits of the rational-comprehensive model, pointing out that different ways of understanding problems and actions imperil what one group might consider rational. Planners erred, the proponents of the humanist approach argue, in assuming that their professional knowledge could simply be transferred from context to context as universal justification for intervention. According to this theory, attention to the diverse ways of conceptualizing the city in a pluralistic society means accepting a degree of irrationality as inherent to the task of planning. The humanists note that the realities and rationalities of the various actors can be almost mutually exclusive. For example, various stakeholders, such as the municipal government, extractive industries, environmentalists, and Indigenous peoples, can radically differ in their visions of a sustainable Arctic city. This variety of views creates a puzzle for urban planners who

are often unable to reconcile these conflicting interests in local SD strategy documents. As some humanists stress, formal planning seen in this larger context becomes only one component of the whole planning process and a broader, more-evolutionary notion of the planning process is needed to account for different realities (Reich 1975: 11).

It should be noted that, despite the obvious collisions between these theoretical approaches, all three can be found in the AZRF city development plans and practical policies. Among the AZRF urban planners, we do not see one theory replacing another. Though many planning specialists believe that the existing dominant paradigm of rational-comprehensiveness is inadequate, other theories also failed to fully explain either urban developmental problems or planning procedures.

Data and Method

The data for this study are drawn from the following sources:

- regional and municipal development and action plans;
- regional and local government reports;
- government position and background papers;
- analytical reports produced by research centers and NGOs; and
- media reports.

As with any study of contested political issues, it is difficult to compile a set of reliable data. Information is often contradictory, misleading, or not fully reported. Research is also complicated by differences of opinion between scholars as regards methods of assessment and interpretation of sources. Moreover, research techniques and terminology vary. Therefore, exercising judgment and comparing sources are important elements in compiling my database.

Since the study does not only entail data collection but also data assessment, three main principles are implemented with regard to selecting and interpreting sources:

- *Validity.* Data should represent the most important and typical trends rather than occasional or irregular developments in the AZRF cities' human security and SD policies.
- *Informativeness.* Sources that provide valuable and timely information are given priority.
- *Innovativeness.* Sources that offer original data, fresh ideas and nontraditional approaches are preferable.

These research techniques help to overcome the limitations of the sources and compile substantial and sufficient data for this study.

What Would an Ideal Urban Planning Process Look Like?

According to public administration postulates, planning is "an anticipatory decision-making process" that helps in coping with complexities (Ackoff 1970: 1–2). It requires deciding a future course of action from different alternatives. Planning is a process that involves making and evaluating each set of interrelated decisions. It entails the selection of missions, objectives, and "translation of knowledge into action. (Ackoff 1970: 2)" Within the planning process, it is important to achieve the optimum balance of needs or demands with the available resources.

ISO 37120 is based on the so-called PDCA (plan–do–check–act or plan–do–check–adjust) model (Deming 1986: 88) that is an iterative four-step management method used in business for the control and continuous improvement of processes and products. It is also known as the Deming cycle. It should be noted, however, that PDCA represents a rather general management model rather than a specific planning approach.

Planning experts suggest a more detailed, five-step result-oriented, process for planning:

1. Identify the goals or objectives to be achieved.
2. Evaluate alternative routes to achieve them.
3. Formulate strategies to achieve them.
4. Arrange or create the means required.
5. Implement, direct, and monitor all steps in their proper sequence. (Goodin 2006: 17–20; Montana and Charnov 2000: 118)

There are two planning components—strategic and tactical (see figure 8.1). Strategic planning decisions are those that are broad in scope, have long-term effects, formulate long-term goals, and are difficult to reverse. Tactical planning decisions are concerned with selecting the most efficient means of pursuing the goals set out in the strategic plan. Tactical/operational planning addresses specific timetables and measurable targets (Schermerhorn 1999: 141). Both types of planning can overlap, but each provides a different level of detail and time frame. Plans are reviewed periodically to ensure a fit with the environment. Tactical plans are usually reviewed and/or revised

Figure 8.1 | *How strategic and tactical plans support each other. Designed on the basis of Schermerhorn 1999: 141.*

frequently, while strategic plans may be reviewed and/or revised only every several years.

Ideally, planning should be every city manager's job as well as an organizational (city administration) function. A municipal planning department may gather data, analyze it, and make it available to top administrators and all local government officials who do the day-to-day planning to phase a project from idea to implementation. Many tools and techniques exist to assist in planning. Among them are scheduling techniques, such as Gantt charts; the critical path method of analyzing the events and time frames that are potential bottlenecks to achieving the desired result; the project evaluation and review technique, which displays all tasks and time frames from start to finish; project management, which allows a manager to phase a project from idea to implementation; and simulation models, which depict various options or what-ifs (Montana and Charnov 2000: 125).

Planning should be tailored for each city or town. Although the basic concepts are the same, each municipality's culture and philosophy will result in a slightly different set of priorities. Levels of involvement and a consistent method of communication are critical to success, as is heavy use of the administrative staff in the planning process.

There are two major responsibilities in the strategic management process (see figure 8.2). The first is strategy formulation. This responsibility involves assessing existing strategies, city administration potential, and the overall environment to develop new strategies and strategic plans capable of delivering future SD strategy. The second strategic management responsibility is strategy implementation.

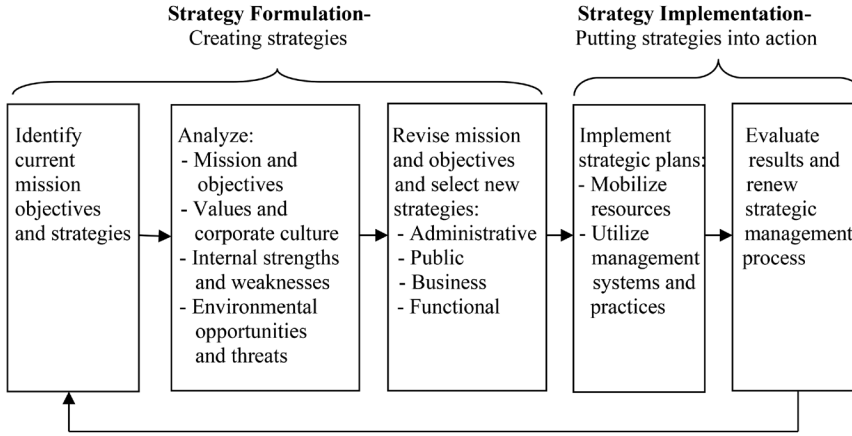

Figure 8.2 | *The strategic management process strategy formulation and implementation. Designed on the basis of Schermerhorn 1999: 159–60.*

Once strategies are created, they must be acted upon successfully to achieve the desired results.

Five major components of planning strategy can be identified: determining opportunity, capabilities, values, and obligations and then matching these factors in a final statement of purpose (Drucker 2011). Objectives, strategies, and policies are not mutually exclusive components of the managerial process but are highly interdependent and inseparable.

Several analytical techniques are helpful in the strategy formulation process:

1. Gap analysis is a planning approach for determining where we are, where we want to go, and how we are going to get there. The ways to close the planning gap are to improve current operations, to develop new policies, or to diversify the city economy, among other options.
2. SWOT analysis is another interesting approach to filling the planning gap(s). In this approach, the strengths (S), weaknesses (W), opportunities (O), and threats (T) for a city are analyzed. Practical recommendations on how to fill the gap(s) and improve the situation in a city are developed on the basis of the SWOT analysis.
3. The McKinsey 7-S Framework can be also used for examining the fits with managerial strategy. These fits fall into seven broad areas: (1) strategy; (2) structure; (3) shared values, attitudes,

and philosophy; (4) approach to staffing the organization (city administration in our case) and its overall people orientation; (5) administrative systems, practices, and procedures used to run the organization on a day-to-day basis, including the reward structure, formal and informal policies, budgeting and programs, training, and financial controls; (6) the organization's skills, capabilities, and core competencies; and (7) style of management (how they allocate their time and attention), symbolic actions, their leadership skills, and the way the top management team comes across to the rest of the organization.

As far as strategy implementation is concerned, management/public administration experts suggest the following algorithm (Drucker 2011; Goodin 2006: 17–20; Montana and Charnov 2000: 151–74; Schermerhorn 1999):

1. The process starts with defining objectives, assigning responsibilities, and developing standards of performance and ends with redefining objectives for the next policy cycle or budget period.
2. As for the management system's objectives, there are three basic types: routine, innovative, and improvement. Routine objectives aim to ensure that they maintain the current level of service while the two other types of objectives are oriented toward making positive changes going forward.
3. The objective should be focused on a result, and not on an activity; and should be consistent, specific, measurable, related to time, and attainable.
4. In some cases an objective cannot be stated in terms of the true result desired because, potentially, it would be impossible to measure the result in any sound way.
5. Responsibilities of specific town administrative units and individual managers/municipal officials should be clearly assigned and put in written form. In the Russian administrative practice, such responsibilities are called job responsibilities or official duties.
6. It is preferable that such responsibilities be formalized in a performance contract where the managers and subordinates put in writing their expectations and commitments for a certain period. Such contracts should not leave any chance for assumptions based on different perspectives and interpretations. There are two parts to the performance contract: (1) statements of key responsibilities and (2) standards of performance for each of those responsibilities.

7. A performance standard should apply to a single responsibility, be specific and attainable, and include a target date for achievement. To the extent possible, a standard of performance should be stated in terms of the result expected rather than in terms of an activity to be carried out.

One more important question is about the nature of planning. In the Soviet era the centralized planning and control system prevailed both in Russia's Arctic and in the country at large. In the post-Soviet period, new modes of more-decentralized planning and control that are more sensitive to the dynamic AZRF realities have emerged. For example, indicative planning loosens up the planning process: Instead of setting taut and unchanging targets, it merely points in certain desired directions and recalibrates future targets in light of what past practice has shown to be realistic aspirations. More generally, present-day Russian policymakers can rely more heavily on loose/soft laws and regulations. Instead of tightly specifying exact performance requirements, the laws and regulations can be written in more general and vaguely aspirational terms (Goodin 2006: 18). It should be noted that most of the AZRF urban development strategies are written in the spirit of indicative planning rather than in a centralized, Soviet-type way.

It should be noted that ISO 37120 has a rather specific interpretation of urban planning and its indicators. Particularly, the system of indicators includes the following:

- Green area (hectares) per hundred thousand population (core indicator)
- Areal size of informal settlements as a percentage of city area (supporting indicator)
- Jobs–housing ratio (supporting indicator)
- Basic service proximity (supporting indicator)
- Urban planning profile indicators:
  - Population density (per square kilometer)
  - Number of trees per hundred thousand population
  - Built-up density

It is obvious that these indicators are of little help for evaluating the AZRF urban SD planning. First, the ISO 37120 indicators reflect urban development rather than the planning process itself. Second, some of these indicators (e.g., green area per one hundred thousand population or number of trees per one hundred thousand population) are simply irrelevant for the Arctic.

For the purposes of the Arctic PIRE project, a special system of indicators for Arctic urban SD planning was developed. The indicators include the following:

1. Ability to Acknowledge the Need to Plan for Sustainability

- Is there a planning office in the city? Or a group of offices that address the 3E's of sustainability (environment, economy, equity)?
- Is planning centralized or decentralized?
- Are there one or more job descriptions that have a sustainability component?
- Does the city have sufficient organizational unity to provide plans for sustainability?
- Are there NGOs and other organizations present that are working on sustainability issues and collaborating with the city?

2. Ability to Provide Holistic and Integrated Views of Sustainability

- Do cities cooperate with regional and federal levels? Have they addressed regional priorities in their sustainability plans?
- Do they base their studies on scientific and cultural assessments?

3. Ability to Engage Community Input

- Do cities have the capacity to engage communities and community inputs?
- Are the plans publicly available, for example on a website?
- How do local communities define sustainability? How important is this issue to the local community?
- Are there opinion polls? What is the amount and transparency of communication?
- Are there attempts to achieve and measure equity?
- How diverse of a community group did the planning process engage? Does it include ethnic or linguistic minorities if they are present?
- Are Russia's public chambers used? These bodies are not made up of elected officials but are a place where anyone can go to arrange public hearings.

4. Ability to Implement Plans for Sustainability

- Are there indicators measuring the implementation of the sustainability plans? How do they follow up?
- Does the city publish a progress report? What are the benchmarks? How often is the progress report published?

- What is the turnover rate among the personnel who develop and implement sustainability plans? Does the organizational and political structure provide a sense of continuity to implement the sustainability plan?
- Are there indexes to measure economic and environmental benefits, and how they are distributed among population?

Although not every indicator is applicable to the existing planning process in the AZRF cities and towns, this index was taken as an organizing principle for this study.

The Russian Urban Development Planning: Conceptual and Legal Aspects

Given the highly centralized nature of Russian political and administrative systems, the AZRF municipal SD strategies are dependent on and interlinked to federal policies in this area. Municipal strategies are based on numerous conceptual and normative documents issued by Moscow, although the federal center encourages subnational units to take into account local peculiarities and to suggest solutions to the specific problems of the AZRF. That is why it is important to understand what kind of conceptual and legal basis for SD strategies exists on the federal level.

It should be noted that the Russian SD concepts and national strategies (in their environmental form) date back to Mikhail Gorbachev's 1987 Murmansk speech, which included a section on the ecological problems of the Arctic. That speech was well received by the Nordic countries and led to various environmental initiatives, such as Finland's 1989 initiative on Arctic environmental protection cooperation, which resulted in a number of technical and scientific reports between 1989 and 1991. This ultimately led to the development of the Arctic Environment Protection Strategy in 1991 and the establishment of the Arctic Council in 1996 (Heininen 2004: 208–9).

Russia signed and ratified the most important international agreements on environment protection and SD: UN Convention on the Law of the Sea (1982); Convention on Biological Diversity (1992); International Convention for the Regulation of Whaling (1946); Fish Stocks Agreement (1995); United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention Concerning the Protection of the World Cultural and Natural Heritage (1972); Convention on the Conservation of Migratory Species of Wild Animals

(1979); Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973); Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matters (1972); International Convention on Oil Pollution Preparedness, Response, and Cooperation (1990); Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (2013); and the International Maritime Organization's Polar Code (November 2014 and May 2015). To date, Russia has a reputation as a responsible regional player that duly implemented the above international agreements.

Moscow made great strides internalizing these international documents and making them an integral part of its national legislation. The Russian national legislation on environmental protection includes the following legal acts: Federal Law No. 7-FZ On Environmental Protection (2002), Water Code of the Russian Federation No. 74-FZ (2006), Federal Law No. 155-FZ On Internal Marine Waters, Territorial Sea and the Contiguous Zone of the Russian Federation (1998), Federal Law No. 187-FZ On the Continental Shelf of the Russian Federation (1995), Federal Law No. 52-FZ On Fauna (1995), Russian Federal Law No. 16-FZ On the Ratification of the Convention on Biodiversity (1995), Federal Law No. 132-FZ On the Northern Sea Route (2012) and its new version No. 525-FZ of 2018. This legislation constitutes an integral part of the international governance system in the Arctic region.

In the social sphere, Moscow's policies aim to foster favorable conditions for the SD of the Indigenous peoples. For example, in 2009 the Russian government approved the concept of SD for the Indigenous small-numbered peoples of the North, Siberia, and the Far East (Putin 2009). Among other things, the concept set forth the general task of raising the quality of life in these regions to the Russian average and the specific task of halving the 2007 infant mortality rate by 2025. However, these policies have still not come close to their targets and the failure to implement them is harshly criticized by Russia's Indigenous peoples and by national and international human rights organizations (Rohr 2014).

In June 2014 President Putin (2014) signed a federal law No. 172-FZ "On strategic planning in the Russian Federation" that prescribed for all levels of government—national, regional, and municipal—having three types of strategic documents: (1) a strategy for socioeconomic development, (2) forecast of socioeconomic development, and (3) specific programs to implement the two former documents. According to this law the municipalities should define strategic objectives for

socioeconomic development and organize monitoring and control over strategic plan implementation. The law also established major principles of strategic planning, such as coherence and integrity, delimitation of powers between various levels of government, sustainability and continuity, balanced nature of the planning system, result-oriented approach and efficiency, clear responsibilities for managers, transparency of the planning process, feasibility and realistic approach, resource-based approach, measurability, relevance of indicators to objectives and, finally, program-targeted principles.

The law on strategic planning has become a legal basis for the development of various normative documents regulating the planning process at the regional and municipal levels. For example, in 2012 the Russian Agency for Strategic Initiatives (2012) launched an Investment Standard (Standard 1.0) to improve the business climate in the Russian regions and increase their investment attractiveness. Having started as a pilot project in eleven Russian regions, Standard 1.0 became a mandatory instrument for assessing a region's investment conditions starting in 2013.

A similar investment standard (Standard 2.0) was developed for municipalities as well. It emphasized the creation of planning and managerial structures in urban administrations, including so-called investment boards; identification of proper objects for investment; building infrastructure for investment projects; and training municipal officials.

Initially, it was planned to launch Standard 2.0 implementation in 2014. However, only a limited number of Russian cities and towns were able to do it. As of this writing in 2019 this standard is being introduced only on a voluntary basis and mainly in the regions that successfully implemented Standard 1.0 (Emelyanova 2014). Although both standards were heavily criticized for their technocratic character and ignorance of local realities, especially in Russia's remote regions, the process of discussing and implementing them was a rather useful exercise in strategic planning that likely will bear fruit in the foreseeable future.

Sustainable Development Planning in Russia's Arctic Industrial Centers: From Theory to Practice

My research shows that, first and foremost, the AZRF industrial cities aim to create and develop an efficient strategy planning system. To make judgments on the administrative/management mechanism's

efficiency, it is necessary to examine whether the city leadership is able to acknowledge the need for SD strategy planning. As municipal documents show, the AZRF local governments understand the importance of having some sort of SD strategy. None of the AZRF industrial cities has a specific SD strategy, but there are sections in the city development strategies and plans that are relevant to this issue. These sections are titled differently, such as, for example, Human/Social Capital Development, Sustainable Socioeconomic Development, and Sustainable Ecological Development.

It should be noted that until recently only cities that are large, by Arctic standards, had development strategies of their own. Relatively small urban settlements usually relied on the so-called target programs. For example, Nickel (in the Murmansk region) had a municipal program on providing urban amenities and urban development, but lacked an integrated development plan (Administration of the Urban Settlement Nikel of the Pechenga District 2017). Interestingly, Severodvinsk, which is a rather large city with a population of some one hundred and eighty-five thousand, stopped adopting comprehensive and long-term plans for socioeconomic development after 2012 and replaced them with three-year forecasts, indicative plans, and targeted programs (Severodvinsk City Government 2010 and 2016). The local government believed that less-ambitious but more-specific plans were more effective in terms of implementation. However, with the adoption of the 2014 federal law on strategic planning, all levels of Russian government, including the municipal governments were obliged to develop socioeconomic development strategies of their own. In May 2018 the Severodvinsk mayor organized a meeting with the local legislators, business community, experts, and NGOs to discuss the prospects for the development of an integrated municipal socioeconomic strategy up to 2030 instead of a set of target programs (Severodvinsk City Administration's Press-Service 2018).

It is also important to know whether a special strategy planning office exists in an Arctic city. Most AZRF municipalities prefer to charge their economic departments with planning functions rather than involve units responsible for environmental or social policies. This tendency brings a certain economic bias to their development programs at the expense of the social/humanitarian and environmental dimensions of their SD strategies. This economic preference also may challenge the integrated nature of planning and give the local development plans a single-issue character. For example, the Murmansk (Murmansk City Government 2013) and Severodvinsk (Severodvinsk

City Government 2010) development plans include almost all aspects of the SD strategy, with the exception of food security. However, the Arkhangelsk development strategy (Arkhangelsk City Government 2008) prioritizes only sectors such as transport infrastructure, health care, education, and cultural heritage preservation, while almost completely ignoring the issues of food, environment, community, personal security, and politics.

Planning units are small and normally consist of several managers even in the largest AZRF cities, such as Arkhangelsk, Murmansk, and Norilsk. For this reason, these units are often unable to fully comply with all classical requirements of the planning management process, including strategy formulation and implementation. It is also difficult for them to properly coordinate their activities with other city administration units that are also involved in the planning and implementation process. For the same reason, it is not easy to mainstream urban sustainability plans in the sense that all parts of the government have some stake in achieving the goals.

Most city development programs have clearly defined outcome goals and implementation strategies, including indicators and benchmarks. However, they may differ in terms of the specific details. For example, while the Murmansk (Murmansk City Government 2013), Norilsk (Norilsk City Government 2012), Severodvinsk (Severodvinsk City Government 2010), and Vorkuta (Vorkuta City Government 2014) strategies have a detailed description of the implementation mechanisms and indicator systems, the Arkhangelsk (Arkhangelsk City Government 2008) and Salekhard (Salekhard City Administration 2007) documents limit themselves to depicting specific project management procedures and setting some general indicators.

The AZRF municipalities aim to develop a proper legal basis for SD strategies, including power-sharing with the federal and regional governments. As mentioned above, by federal law the Russian municipalities must coordinate their development plans and programs with the regional and federal SD strategies. However, this coordination is done by the AZRF cities in different ways. For example, in the Murmansk development plan each strategic priority is linked to the specific regional and federal programs (Murmansk City Government 2013: 108–69). In contrast, the Arkhangelsk, Norilsk, Salekhard, and Vorkuta development strategies mention the need to coordinate with the higher levels of governments only here and there (Arkhangelsk City Government 2008: 51–52; Norilsk City Government 2012: 105–7, 170; Salekhard City Government 2007: 32–33; Vorkuta City Government 2014: 84).

The AZRF municipalities are rather cautious about any federal initiatives in the field of strategic planning. For example, Moscow's efforts to introduce the Standard 2.0 got a cold shoulder in the northern cities. In 2014 about eighty municipalities across the country were selected to implement the project. However, in the AZRF only several municipalities in the Murmansk region, where Standard 1.0 on the regional investment climate was successfully implemented, currently participate in the experiment with Standard 2.0 designed for providing a favorable investment climate at the municipal level. Four municipalities are considered pilots (the Pechenga and Kola Districts, Monchegorsk and Murmansk), other municipalities (Polyarnye Zori, Apatity, Kirovsk, Olenegorsk, and Kovdorsky, Lovozersky, Tersky and Kandalaksha Districts) implement only certain elements of Standard 2.0. The only municipality that has fully implemented all elements of Standard 2.0 is Murmansk itself. This success can be explained by the fact that it is the capital of the region and therefore has larger financial and human resources than other municipalities (Emelyanova 2014).

To provide SD strategies with a proper societal setting, they should support transparency in the planning process and encourage public input and community engagement. Theoretically, the Russian Arctic municipalities have several instruments to organize the planning and implementation process in an open and democratic manner: regular opinion polls, public discussions in the media, regular hearings in the public chambers, and dialogue with NGOs. However, only Severodvinsk has a special municipal program to facilitate the local NGOs' development (Severodvinsk City Government 2016). The Murmansk and Vorkuta development plans hardly mention the need for a dialogue with civil society institutions (Murmansk City Government 2013; Vorkuta City Government 2014). Other AZRF cities simply ignore this issue, assigning the SD strategy planning process entirely to governmental structures.

As far as the environmental aspect of the SD strategies is concerned, the AZRF municipalities have the following priorities:

- Prevention and reduction of pollution rather than cleaning up existing contaminants as was the case before
- Rehabilitation of damaged natural environmental systems (damage assessment, targeting the priority areas, clean-up programs in some cities, monitoring)
- Solid and liquid waste treatment
- Targeted programs to protect endangered species

- Development of public-private partnerships in the environmental protection sphere
- Encouraging environmental research (support for local universities and research centers)
- Developing environmental education and culture
- Cooperation with the local environmental NGOs and mass media to promote green projects and culture
- Development of monitoring systems in various areas (prevention of natural and man-made disasters; air and water pollution; endangered species, etc.)

AZRF cities differ with regard to their views on the significance of environmental problems in the SD strategies. While for some municipalities, such as Arkhangelsk, Murmansk, and Salekhard, environmental issues are one of several policy priorities, for Monchegorsk, Nickel, Norilsk, and Severodvinsk, where the ecological situation is rather grave, the need to solve the environmental problems is critical. These cities are traditional centers of metallurgical production, and of machine- and ship-building industries, and for this reason are heavily polluted and pose serious health hazards. Russian scientists identified twenty-seven so-called impact zones where pollution has led to environmental degradation and increased morbidity among the local population. The main impact zones include the Murmansk region (10 percent of total pollutants in the twenty-seven impact zones), Norilsk urban agglomeration (more than 30 percent), West Siberian oil and gas fields (more than 30 percent) and the Arkhangelsk region (around 5 percent) (Dushkova and Evseev 2011; Ekologicheskoe Sostoyanie Impactnykh Raionov 2012). In sum, about 15 percent of the AZRF territory is polluted or contaminated (Kochemasov, Morgunov, and Solomatin 2009).

As mentioned above, the AZRF cities pay little attention to the purely human security dimension, preferring to focus on economic and environmental issues. The human dimension of the SD strategies is mostly represented by the municipal programs on civil defense (Murmansk City Government 2013; Severodvinsk City Government 2010; Vorkuta City Government 2014) to protect the local population from natural and human-created catastrophes. Some development plans (Murmansk City Government 2013; Severodvinsk City Government 2010) also have sections on personal security, including the need to deter street violence.

Almost all city development plans mention the need for international cooperation, including in venues such as the Arctic Council, Barents

Euro-Arctic Council, International Polar Year, Intergovernmental Panel on Climate Change, United Nations Environment Program (UNEP), United Nations Development Program (UNDP) and UNESCO programs, and country-to-country, region-to-region, and town-to-town collaborations.

Conclusion

As this chapter shows, the Russian Arctic municipalities have familiarized themselves with the concept of SD. To some extent, this concept was embedded in municipal development plans and strategies, although the AZRF cities lack special SD strategic documents; in addition, quite often economic, ecological, and social dimensions are not properly harmonized with one another. The Arctic municipalities view the development of sound urban planning strategies as an important policy priority. They have tried to create proper legal and institutional settings for the development and implementation of such strategies. They also have tried to cooperate with regional and federal authorities in the field of strategic planning and solving concrete socioeconomic and ecological problems.

They have made great strides in implementing some SD-related projects over the past ten to fifteen years; most of these projects addressed economic and environmental issues. There was a clear shift from survival-based approaches that were simply reactive to various crises to more-proactive capacity-building SD strategies. These efforts resulted in some success stories, albeit rather modest ones.

However, there is still a long way to go, in terms of both the development of adequate policies and their effective implementation. The main problem is how to solve the words and deeds problem because many of the SD projects still remain on paper and have never been implemented. In other words, the gap between strategy formulation and implementation still exists.

The weak points of the AZRF urban development strategies include a lack of transparency in the policy-planning process and a lack of cooperation with and involvement of civil society institutions. To a large extent, the policy planning and implementation process is still of the top-down rather than bottom-up nature. Moreover, not all SD-related issue areas are addressed, and different strategic approaches are not properly synchronized with one another. Finally, quite often municipal SD programs and projects are understaffed, underfunded, and not supported by regional and federal authorities.

Hence, larger staff and funding as well as better coordination of SD strategies between different levels of government are badly needed.

To conclude, despite the above problems and shortcomings, the total balance sheet of the Arctic cities' SD strategies and general dynamics is rather positive. The AZRF municipalities are serious about solving numerous socioeconomic and environmental problems and making these urban areas better and more comfortable places to live.

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CHAPTER 9

Transport Connectivity and Adapting to Climate Change in the Russian Arctic

The Case of Sakha Republic (Yakutia)

Aleksandra Durova

Introduction

Sustainability has been recognized as a pressing issue for the past three decades, and climate change has been an important stressor and threat to sustainability in the Arctic. Current sustainability challenges in Arctic settlements relate to their urbanization trajectories, inherited vulnerabilities, and development uncertainties. Arctic cities today, despite their diversity, are nodes of unevenly developed and poorly connected territories with low population densities (Bashmakova et al. 2013; Pilyasov 2013). They have been historically susceptible to adversities and the variability of climate conditions, and are increasingly exposed to new risks posed by climate change. Ensuring the sustainability of these cities is not possible without taking into account the impact of climate change in all of its implications.

Northern settlements have relied on a few core transport corridors, typically seasonal water transport and ice-roads, for supplies of food, energy, and essential materials (Selin, Skufina, and Bashmakova 2016). Eight Russian Arctic regions rely on specialized delivery, called the Northern Supply, to areas with limited transport access, to ensure that they receive the necessary provisions (Zvorykina 2017).[1] The

Northern Sea Route (NSR), which is navigable on average for 3.5 to 5.5 months a year (Vasiliev, Gritsevich, and Selin 2009), has remained the exclusive delivery option for dozens of remote Russian Arctic settlements along the Arctic Ocean coast (Shpak and Serova 2011). The NSR, combined with river transport, provides a twelve-month provision of supplies (Bashmakova et al. 2013). However, in the context of climate change, Arctic communities face increasing vulnerabilities related to disruptions of the very transport connectivity that is vital for sustaining life, economic prosperity, and security (Arctic Council 2013).

Currently, connectivity disruptions are related to changing hydrology and shallow waters in rivers (Bashmakova et al. 2013; Koetse and Rietveld 2009), shorter operational periods for critical ice-roads and ice-crossings (Stephenson 2013), and risks of infrastructure failures due to thawing permafrost (Streletskiy, Anisimov, and Vasiliev 2015). The reduction of sea ice in combination with rapid permafrost degradation creates risks of coastal erosion and the need to relocate communities (Jones et al. 2009; Paglia 2018). In this context, the sustainability of settlements and the livelihoods of communities depend on their adaptive capacity, which in turn is greatly affected by external conditions, such as government policies in the Arctic and adaptation actions across various scales and sectors (Carson and Peterson 2016).

Transport performance, as a tenet of sustainability, is reflected in the framework of ISO indicators described in the book's Introduction. The transport indicators included in the ISO primarily focus on measuring elements of an urban transport system, urban mobility, and road safety within municipal boundaries. The only indicator that measures transport connectivity between cities and other parts of the region, country, and world is the Commercial Air Connectivity indicator, which measures the number of non-stop commercial airline destinations served from the city's airports. Flights are indicative of one connectivity dimension, but a sole focus on this indicator overlooks other dimensions pertinent to freight transport. For example, Yakutsk, the capital of Russia's Sakha Republic and a key northern hub in eastern Siberia, performs relatively well with respect to commercial air connectivity compared to the largest Russian Arctic cities. However, relying on this particular indicator alone to measure transport connectivity can be misleading, because it does not reflect the reliability of transport networks and physical infrastructure, quality of service, and access to regional trade partners.

A World Bank (2018) effort to measure the domestic freight connectivity between Russian regions shows great disparities among regions

regarding freight connectivity to their top five trade-partner regions. The weighted travel time for Yakutia exceeded eleven days, while for Moscow it was less than five days. Constructing a single indicator for comparative purposes on a large scale is challenging due to methodological limitations and a lack of data. The World Bank calculated freight connectivity as weighted travel time between regional capitals accounting for respective trade volumes by mode (road, rail, and river). Similar to the ISO air connectivity indicator, such a measure of freight connectivity would not be suitable for a granular analysis of regional connectivity, considering the distribution of freight flows and possible delivery disruptions, which are becoming more frequent due to changing climate conditions and other factors.

All in all, the current ISO indicators overlook multiple dimensions of connectivity and should be complemented by a more detailed examination of connectivity issues to better reflect Arctic circumstances. To more effectively measure sustainability, a key indicator that is needed is one that gauges the ability of the system to adapt to climate changes that threaten the connectivity of cities. In the Arctic, where cities are often remote and isolated, the ability to ensure connectivity is crucial.

Given the need to understand how climate change affects connectivity between Arctic cities, this chapter draws attention to climate change impacts on the Sakha Republic's transport system, and examines the efforts to mitigate these impacts. The discussion focuses on what adaptation measures are planned and implemented if at all, why they are implemented, and what potential sustainability implications they have. The discussion explores triggers of adaptation actions and risks that are expected to be addressed. With regard to the sustainability implications of these adaptation actions, the discussion in the chapter considers whether the adaptations (1) address causes of vulnerabilities, (2) promote more-sustainable development trajectories, and (3) deal with all foreseeable risks. Adaptation in this chapter is understood as policies, projects, strategies, or other tools "seek[ing] to moderate or avoid harm or exploit beneficial opportunities" (Intergovernmental Panel on Climate Change [IPCC] 2014: 118), which can directly respond to climate change or be triggered by nonclimatic motivations (Smith et al. 2000). The central thesis is that measuring the sustainability of Arctic cities requires a strong understanding of how these cities will be able to respond to climate changes that threaten to sever vital transportation links.

Data and Methodology

This case study analysis of connectivity issues in Sakha Republic relied on two main sources of data. First, the study used analyses of online media sources, including official press-releases from government websites, local news, and online video interviews. The online search was conducted using key words identified from the literature review of potential climate change impacts on transport in the Arctic, in particular including the latest report of Roshydromet (2017) that summarizes climate risks in Russia.[2] Second, the study included qualitative analysis of official government documents. Given that regional transport policy and investments are closely interwoven with federal Arctic and transport policies and funding, documents were selected at the level of strategies and programs both at the national and regional scales, which were effective or planned at the time of the study.[3] The study explores river, sea, road, and railway transportation modes within the region, with a focus on freight. Air transport is not examined, because climate change impacts on air transport are much less obvious compared to other modes, and air plays a relatively less significant role with regards to freight movements in the Russian Arctic.[4]

There are a few limitations of the chosen methodological approach. First, it is worth noting that there are still no national and regional adaptation strategies and plans,[5] and actions covered in this study may not be definitive of all adaption actions, or could not capture their latest status of planning and implementation. Second, as the adaptation literature demonstrates, adaptation actions are not necessarily purposeful and driven by climate change risks alone, but might be incidental and triggered by a combination of factors (Berrang-Ford, Ford, and Paterson 2011; Smith et al. 2000). This study lacks details on the implementation of adaptation actions, as well as factors, beyond those that were identified in available data sources, that might challenge or stimulate implementation. For next steps, these findings will need to be triangulated through interviews with stakeholders involved in planning and implementation at different levels of government and the private sector to provide a more nuanced understanding of an adaptation landscape, barriers and opportunities, and impacts on settlements and communities.

Yakutia under Climate Change Uncertainty

The Republic of Sakha (Yakutia) is home to 967,000 people (Rosstat 2019a), more than 120 ethnicities (*Labour, Transport and Energy Development Concept 2020* 2006), and around 40,000 Indigenous people (Rosstat 2010). The region is unevenly populated, with almost 50 percent of the total population concentrated in the Central Administrative District and the least populated northern and eastern areas of the region (*Labour, Transport and Energy Development Concept 2020* 2006). Almost sixty-six percent of the region's population is urban,[6] of which almost 50 percent lives in the city of Yakutsk (Rosstat 2019b). Yakutia has extreme climate conditions, with more than a 100°C difference between winter and summer extreme temperatures. With the overall warming of the Arctic, evidence from literature on Yakutia demonstrates uneven changes in climate throughout the region (Kirillina 2017; Shiklomanov et al. 2017), and projections suggest warming in the future (Kirillina, Lobanov, and Serditova 2015).

The region has an unevenly developed inland transport system that is sensitive to seasonal variations and changes in climate and provides poor connectivity (*Yakutia Transport Program 2022* 2017). The existing transport system in Yakutia inherits vulnerability to climate from the network developed during Soviet times. The development of the transport network was driven by aspirations of exploring for natural resources, but at the same time had to face large distances, high construction costs, extreme climate conditions, and low population density. As a result, the region relied on a few core transport arteries for intra- and interregional connectivity. It is a seasonal network (rivers, ice-roads, ice crossings, and the NSR) with gaps along the main road corridors that were always vulnerable to climate conditions and risks. Economic decline during the post-Soviet transition in the 1990s led to deterioration of the transport system, including declining quality of roads and decay of port infrastructure and navigation systems (Stepanova 2013). Since the 2000s the regional government has focused on addressing gaps and completing missing transport links like the Berkakit-Tommot-Yakutsk Railway[7] (Stepanova 2013; *Territorial Planning Concept* 2011) that is vital for the Sakha Republic's economy and the livelihoods of communities. Addressing these gaps can be expected to reduce existing vulnerabilities and provide more-reliable connectivity to the people in the region. New circumstances brought by climate change, however, are likely to require additional measures beyond those just outlined.

Yakutia historically has relied on water transport for shipping freight for economic development and sustaining communities, and shipping is unlikely to be replaced by other modes in the foreseeable future (*Yakutia Transport Strategy 2025* 2004). The river system is expansive and is represented by large rivers like the Lena, Aldan, Vilyui, Yana, Indigirka, and Kolyma Rivers, as well as small feeder rivers, that all serve communities within the region. River transport, reportedly, annually carries 40 percent of annual freight turnover during the navigation season (*Yakutia Water Transport Program 2036* 2017), which lasts up to four months on big rivers and about a month or less on small feeder rivers (Vasiliev, Gritsevich, and Selin 2009). Supplies into the northern areas adjacent to the Laptev and East-Siberian Seas are limited to around three months of ice-free navigation, while for the remainder of the year delivery is challenging and expensive (Vasiliev, Gritsevich, and Selin 2009). The NSR currently supplies up to one hundred thousand tons of oil products into the region (Press-Center 2016).

Between river navigation seasons, transportation and delivery throughout the region rely to a large extent on ice-roads. Around 90 percent of Yakutia's territory, where 84 percent of the population resides, lacks a year-round road network (*Draft Socio-Economic Strategy 2030* 2016; *Yakutia Safety Program 2022* 2017), and 73 percent of existing roads in the region are either seasonal or depend on ice crossings[8] (Draft Law on Advanced Delivery 2017). Both rural communities and cities depend on seasonal ice-roads. For example, the city of Yakutsk with its population of almost 308,000 people (2017) relies on an ice crossing to connect to the road and railway network across the Lena River. Delivering into the city, except for expensive air transport, is done by a ferry in summer or via an ice crossing in winter (*Yakutsk Strategy 2032* 2015). Currently, 248 out of 641 settlements lack year-round connections with the main road network (*Yakutia Transport Program 2022* 2017). Settlements in the North often rely on air transport and off-road vehicles, which makes travel and shipments unreliable and expensive (*Yakutia Transport Strategy 2025* 2004).

The State of Adaptation in Yakutia's Transport

Adaptation in transportation is increasingly important at regional and municipal levels in Yakutia and involves a variety of actors, but the state of adaptation planning remains in its infancy. Adaptation measures are ad hoc and generally driven not by climate change alone

but a combination of factors. Adaptations relate to vulnerabilities that have their roots in spatial development, governance, economic constraints, and organizational failures, and are based on a limited understanding of future social, economic, and environmental risks. Existing adaptation measures in Yakutia's transport sector respond to emergency and safety risks or are driven by motives to exploit opportunities associated with climate change. Similarly, in other contexts adaptation better resonates with governments when it is contextualized within development issues and relates to public safety (Measham et al. 2011), security (Hodson and Marvin 2009), or if it offers development benefits and reduces vulnerabilities in the longer term (Klein et al. 2007).

Degradation of permafrost, navigation problems, delivery failures, and connectivity disruptions within the region occur in the context of extreme climate conditions, decaying infrastructure, and budget constraints that add a sense of urgency to adaptation responses. The lack of adaptation threatens economic losses, environmental degradation, and infrastructure failures. On the other hand, adaptations driven by motivations to tap into potential opportunities brought by climate change are associated with improvements of transport infrastructure and connectivity, expansion of exports, and economic gains. The following discussion provides several examples of risks posed by climate change, adaptations, and their sustainability implications in the context of the Sakha Republic.

Responses to Experienced Safety and Emergency Risks

Rather than being planned as part of a comprehensive process, many of the adaptation responses in Sakha Republic are in fact just reactions to emergency situations. This reactive approach can be seen in the responses to permafrost degradation and past connectivity disruptions.

Permafrost degradation and thawing have been of growing concern in the region with respect to risks of infrastructure failure and connectivity disruptions (Romanova 2017). Changes in the bearing capacity of permafrost, cryogenically destructive processes, and uneven settlement of the ground under buildings and pipelines threaten the safety and stability of infrastructure (Osipov 2016; Roshydromet 2017; Yakovlenko et al. 2017). Permafrost impacts, however, are location specific and unevenly distributed within the region (e.g., see studies by Nelson, Anisimov, and Shiklomanov 2002; Vorontsova 2017). Together with melting sea ice, thawing permafrost is expected

to profoundly affect the coast along the Laptev and East Siberian Seas (Yakutia). Records already show a retreat of the coastline varying from a few to a hundred meters per year (Alekseeva 2016; Maslakov and Kraev 2016), and coastal erosion can create risks for communities and transport infrastructure. There are known engineering solutions to address thawing-induced risks. However, it remains unclear to what degree they are being used with regard to the existing and new infrastructure. Planning for adaptation requires understanding location-specific cryogenic processes and future risks, mapping the vulnerability of transport networks, and understanding location-specific adaptation needs (Osipov 2016).

In 2018 the Sakha Parliament passed a law on Preservation of Permafrost (N 2006-3 N 1571-V). In 2017 the Sakha legislatures initiated a discussion on adopting a federal law on Preservation and Rational Use of Permafrost with a committee of the Federation Council, the upper chamber of the national parliament. The law spells out the need to monitor permafrost conditions, supervise land use, track factors (including anthropogenic ones) that may lead to permafrost degradation, and identify actions to protect people from possible negative consequences (Vasilieva 2018). This law is a clear step toward planned adaptation in the region and addressing cryogenic risks to infrastructure and communities.

On the other hand, regions are limited in promoting anticipatory or planned adaptation actions with regard to sea coastal protection, since it falls under federal jurisdiction, specifically that of the federal Ministry of Construction. Reportedly, regional authorities currently cannot initiate preparation of engineering designs to include coastal protective measures because this would be considered a misuse of funds (Kudrin 2017). Authorities and scientists noted that it would be important to delegate some planning responsibilities to the regions. The Ministry of Economic Development is considering legal amendments[9] that would provide flexibility allowing regions to act on climate change—for example, to plan for coastal protection (Kudrin 2017).

In essence, these proposed legislative changes, together with research and systematically applied engineering solutions, can potentially increase resilience of transport networks to climate change. Causes of vulnerabilities, however, span various issues, from engineering design standards that have, reportedly, not accounted for climatic variability (Kirillina 2017; Kudrin 2017), to budgetary limitations in the region to maintain and upgrade transport infrastructure (Regnum 2017a), to spatial policy aligned with construction of infrastructure

on permafrost under conditions of low population densities and large distances between settlements (Stepanova 2013).

Timing and duration of river navigation have become less predictable due to declining water levels, resulting in connectivity disruptions (*Yakutia Water Transport Program 2036* 2017). For example, during the 2015 river navigation season, water levels were low for as long as forty-five days in some locations (Poleshkina 2017). Even though, as noted by the chairman of the Sakha Parliament's Committee for Land, Natural Resources and Environment, little research has been done on how climate change has affected river systems in Yakutia during the past twenty years (Romanova 2017), scientists and authorities have offered explanations for this problem. Degradation of permafrost changes hydrological regimes and negatively affects freshwater navigation (Bashmakova et al. 2013). Officials also refer to frequent forest fires in the neighboring region, droughts, as well as insufficient dredging,[10] affecting water levels on the upstream portion of the Lena River (Regnum 2017b; Yakovlev 2017). Navigation problems have made delivery challenging, unpredictable, and costly. Shallow waters and forest fires can paralyze delivery during short navigation seasons, as happened on the Aldan and Indigirka Rivers in 2012 (Vinokurov 2012). They can also limit loading of ships, resulting in slow and risky delivery. For example, in August 2016, ships could only load up to one third of their capacity, and transportation costs surged resulting in higher prices for delivered fuels (Tuktarova 2017).

Navigation disruptions and failures of the Northern Supply have led to emergency situations when communities faced the possibility of not having essential goods or heating fuels (*Yakutia Water Transport Program 2036* 2017). For example, in 2013 shallow waters on the Indigirka River and the shorter navigation period resulted in only half of planned supplies (coal, oil, liquid natural gas, food, construction materials, and agricultural produce) reaching communities on time. The Ministry for Emergency Situations had to declare emergencies in three administrative districts and send supplies, including coal, by air ("Timely Comments" 2013).

Climate change also poses risks of a shorter season for ice-roads, jeopardizing their safety and, as a result, disrupting connectivity within the region (A. Vasiliev 2017). According to local media coverage, there are already evident risks of late openings of ice-roads and disruptions in delivery by road transport. For example, in the winter of 2016–17, snowfalls and warmer weather delayed opening of winter roads in some remote settlements, putting communities at risk of depleting supplies before the arrival of trucks (Taurskiy 2017),

which reached some villages in April instead of the planned January (Yakovlev 2017).

Risks related to disruptions in connectivity trigger adaptation responses by regional authorities aiming to prevent emergency situations that leave communities without subsistence and heating. For example, emergency risks related to navigation conditions on rivers made the regional government reconsider how the Northern Supply is organized. The recent completion, after many years of construction, of the Berkakit-Tommot-Nizhny Bestyah railway line finally opened up an opportunity to bypass the Lena River's shallow upstream and consider shifting freight from river transport to the railway, as far as Nizhny Bestyah, where cargo can be transferred back to river transport and trucks. However, these organizational changes had not been feasible until the train line opened. Until then the Lena's shallow water made navigation unreliable (Taurskiy 2017). Furthermore, given the shift in navigation seasons, the government is also considering creating an earlier delivery schedule. However, as noted by the former head of the Sakha government, early delivery requires longer storage and improvements in storage facilities, and therefore the republic is seeking support from the federal budget to build storage facilities in rural areas (Yakovlev 2017). These examples demonstrate that adaptation actions depend on the state of infrastructure development, and their feasibility is closely related to the availability of infrastructure, as in the case of the railway line and sufficient storage facilities.

Unfortunately, Sakha adaptation responses are reactive and do not address causes of vulnerabilities. As in the case of the Northern Supply, vulnerability to climate change relates to a combination of infrastructure, organizational, and structural factors. As noted by academics and authorities, transition of the Northern Supply to market principles during 1990–2004 and the lack of national regulation have left the Northern Supply system decentralized and uncoordinated (Vasiliev, Gritsevich, and Selin 2009). There are multiple participating actors, including those in the private sector looking for profit, and regional and municipal governments bearing the ultimate social responsibility to provision remote cities ("Il Tymen" 2014; *Yakutia Safety Program 2016* 2013; "YKTIMES.RU" 2017). In the case of rapidly changing climate conditions and under financial constraints, the private sector is unable to adapt quickly, while the government has to either react to find more sustainable ways to address problems or bear costs in case of emergencies. The Northern Supply system under the conditions of extreme climate and limited transport accessibility was initially founded on the principles of centralized organization and

funding (Vasiliev, Gritsevich, and Selin 2009). However, the current decentralized organization and planning for the delivery of necessary supplies under conditions of limited transport connectivity and a lack of funding grows even more complicated due to uncertainties brought by climate change.

Adaptation Driven by Motives to Exploit Opportunities

In Sakha, adaptations also take the form of investments in infrastructure that are driven by developmental intentions rather than climate change threats. They are designed to fuel economic development in the region, revive and expand transport links, and serve increasing transport demands including exports. Nevertheless, they are also meant to address existing challenges related to transport connectivity that have legacies in the political economy transition in combination with changes in climate. Outcomes and implications of such adaptations are closely interwoven with the state of infrastructure development and development trajectories. Investments in infrastructure (for example, road and railway networks, inland water transport and the NSR) are limited to strategic links serving economic and spatial development. They are expected to increase the resilience of the transport system and, therefore, reduce negative impacts of transport and delivery disruptions on connected settlements. However, the implications of such investments for communities can be mixed with regard to their subsistence economies, food security and cultures, environmental consequences of industrial development and increased transportation flows, and other impacts that are not yet fully anticipated.

The warming of the Arctic Ocean is expected to open up potential opportunities for longer ice-free navigation, exploration of natural resources and exports, and commercial shipping. Transportation investments reflected in national and regional strategic plans and programs related to the revival of water transport (for example, *State Arctic Development Program 2015–25* 2017; *Yakutia Water Transport Program 2036* 2017) serve aspirations of economic interests in the Arctic and respectively anticipated increasing transport demand. At the same time, given that rivers are becoming shallow and navigation more unpredictable, while navigation in the Arctic Ocean is becoming longer, the growing use of the NSR promises transport alternatives for regional supplies and economic development (Arctic Strategy 2020 2013; *State Arctic Development Program 2015–25* 2017; *Yakutia Transport Program 2022* 2017). Yakutia is projecting almost

a five-fold increase of freight delivery by the NSR by 2030 (*Yakutia Water Transport Program 2036* 2017).

Inland water transport, together with the NSR, is increasingly important in light of the anticipated future expansion of supplies, including those serving investment projects[11] in the North-Yakutian Core Arctic zone that are considered important for the spatial and economic development of the region (*State Arctic Development Program 2015–25* 2017). Currently, annual river transport carries on average around 2.8 million tons of cargo per year, half of which is life-sustaining goods, and around a third is for projects related to exploration of the Arctic. Furthermore, water transport is an integral part of the future international transport corridor China-Yakutia-NSR, the vision for which is spelled out in the *Yakutia Water Transport Program 2036* (2017). To support these aspirations and address current navigation problems, the State Arctic Development Program 2015–25 (2017) is funding construction of a dock yard in Zhatai to upgrade the river and river-sea fleets for socially important freight supplies. The regional government in its turn is providing financial support to transport enterprises for upgrading their outdated fleet. Sakha is also expecting to receive an additional dredging ship constructed with federal funds[12] to ensure navigation on the Lena, Yana, and Indigirka Rivers (*Yakutia Water Transport Program 2036* 2017).

Ambitions with regard to the revival of shipping in the Arctic Ocean, however, require investments in ice-breakers, modernization of decayed port infrastructure, provision of search and rescue services, hydrometeorological monitoring and forecasting, and emergency and disaster planning (*State Arctic Development Program 2015–25* 2017; *Yakutia Transport Strategy 2025* 2004) that all fall under federal jurisdiction, and to some degree are covered by the current federal program.[13] The current state of their development, as well as expectations of increased shipping in the Arctic, is a growing concern because of implications it may have in case of oil spills and environmental disasters (World Wildlife Fund [WWF] Russia 2008) and negative impacts on local communities (Heininen, Sergunin, and Yarovoy 2014; Stephenson, Brigham, and Smith 2014).

Overall, vulnerabilities to climate change in the transport sector largely depend on spatial and economic development trajectories. According to strategic documents, core investments in transport continue to serve exploration of natural resources, exports, and markets (*Draft Socio-Economic Strategy 2030* 2016; *Labour, Transport and Energy Development Concept 2020* 2006), and shape axes, around which connectivity gaps are likely to be addressed. At the same time,

according to the spatial planning documents, spatial development of the region would follow a fly-in/fly-out principle, which means that it is infeasible to expand or build new settlements around industries in addition to those core towns that have existed since Soviet and earlier times. Settlements that lack permanent populations and economic activity are planned to be closed. Strategic plans also prioritize year-round connections between core towns as part of main transport corridors, as well as road-river connections in the on/off areas. At the same time, areas in the North, within the Arctic Circle, with a total population of around 30,000, are expected to remain without year-round connections and continue to rely on seasonal and air transport (Territorial Planning Concept 2011). To a large extent these areas will depend on how the transport system will be adapted to changing climate conditions. Even though some current and planned adaptation actions may reduce some vulnerabilities through investments in year-round networks and other infrastructure, they, being driven by economic and geopolitical motivations in the Arctic, perpetuate the region's dependency on the exploitation of natural resources and can yield unsustainable outcomes.

Conclusion

This chapter argues that ISO 37120 does not do enough to measure the level of connectivity between cities that is important for their sustainability. The current focus on air connections should be supplemented with indicators measuring connectivity and reliability of multiple transport modes as well.

Beyond those simple indicators, measuring sustainability requires understanding how climate change will affect the level of connectivity between cities in the future. This case study provides a critical examination of how Sakha Republic is addressing the climate change challenges to connectivity. The central conclusion is that rather than addressing the core problem of climate change challenges, Sakha's adaptions are focused on other priorities, such as responding to emergencies and developing the ability of the republic to engage in resource exploitation.

In terms of sustainability implications, adaptation actions that aim to respond to or prevent emergencies do increase the resilience and reliability of transport networks or supplies, but do not address causes of vulnerabilities. These causes cut across multiple scales, from design standards and poor connectivity, to budgetary

limitations and spatial policies. For example, preexisting conditions in the case of the Northern Supply, such as limited connectivity, poor infrastructure, transition to decentralized planning, and shortage of funding, make adaptation more difficult. This aligns with the current understanding of limitations of sectoral, infrastructural and spatial adaptations in addressing root causes of vulnerabilities. More transformative approaches may include institutional reforms, behavioral shifts, cultural changes, questioning of values, and reorientation of development (O'Brien 2012; Pelling 2011).

Furthermore, current and planned investments in infrastructure associated with the revival of water transport and year-round road networks to some degree are expected to reduce vulnerability, exposure, and sensitivity of communities to climate change risks that cause delivery disruptions. However, what impacts they may have on other dimensions of community resilience, for example food security, traditional subsistence economies and cultures, remains understudied. For example, infrastructure development driven by objectives not aligned with interests and lifestyles of local communities can have detrimental effects and reduce their adaptive capacity, and interrupt ecological systems that can be an important livelihood source (Carson and Peterson 2016; Forbes et al. 2009). Also, such adaptations, being driven by economic and geopolitical interests in the Arctic, are inherently built on the growth imperative, perpetuate the region's dependence on exploiting natural resources, and can result in unsustainable outcomes. For example, the current state of the NSR infrastructure, as well as an expected increase in shipping in the Arctic, may lead to negative and even disastrous outcomes, such as oil spills, environmental destruction, and further contributions to climate change. Although Arctic policy has been at the front line of the Russian Federation government agenda, the absence of a national adaptation policy and supporting regulatory environment and funding impede planning and implementation of adaptation actions. Indeed, findings demonstrate that the role of the federal government is important with respect to various issues, from infrastructure design standards and funding to policy-making. Coordination with the federal government and between regions is essential for pushing adaptation initiatives forward, for example with respect to legal changes and funding for large projects. While adaptation actions need to account for regional differences, a national policy would be essential for establishing a legal foundation, responsibilities, and preparing the ground for collaboration between government agencies and between regions.

Most identified adaptation actions are not stand alone in terms of planning and implementation. They cannot be separated from existing challenges and tasks. For example, inefficiencies of the Northern Supply combined with impacts and uncertainties brought by climate change require searching for solutions either at the federal or regional levels since investments into connectivity and infrastructure are inseparable from spatial and economic policies. In such cases, adaptation measures would be incorporated into sectoral reforms and investments. Accordingly, transfer of responsibilities for adaptation planning from the federal to the regional level needs to be accompanied with clear funding arrangements to ensure successful outcomes.

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Notes

1. The Northern Supply (Government Decree 402 2016) in practice means a set of measures undertaken by the authorities to ensure delivery of life-sustaining goods to the remote settlements with transport access of fewer than 180 days a year (Zvorykina 2017).
2. The key words included "permafrost," "shallow rivers," "navigation," "flooding," "winter roads," "advanced delivery," "Northern Supply," "infrastructure," and "Northern Sea Route" in combination with "transport" and "climate change," "global warming," and "Yakutia." The search of online sources was done in Russian.
3. Arctic Strategy 2020 (2013); Draft Law on Advanced Delivery (2017); Draft Socio-Economic Strategy 2030 (2016); Yakutia Transport Strategy 2025 (2004); Labour, Transport and Energy Development Concept 2020 (2006); State Arctic Development Program 2015–2025 (2017); Territorial Planning Concept (2011); Yakutia Safety Program 2022 (2017); Yakutia Transport Program 2022 (2017); Yakutia Transport Strategy 2025 (2004); Yakutia Water Transport Program 2036 (2017); Yakutsk Strategy 2032 (2015).
4. On average during 2005–10 river transport's share of freight turnover was around 60 percent, auto transport was 30 percent, railway was around 6 percent, sea was almost 5 percent, and air was less than 2 percent (in million ton-km). In tons on average during 2005–10, auto transport took over 86 percent of freight, river transport took 8 percent, and railway took 5 percent; sea and air transport's shares were less than 1 percent, according to statistics from the Yakutia Transport Program 2019 (2011).

5. Russia has not yet developed a national adaptation strategy and only a few regions (the Murmansk region (in 2009), Saint-Petersburg (in 2009), and the Arkhangelsk region (in 2014) have designed pilot regional adaptation strategies (Kirillina 2017).
6. Living in towns or urban settlements: in 2018, nine urban settlements with population over ten thousand people and forty-six urban settlements with population less than ten thousand people (Rosstat 2019b).
7. The Berkakit-Tommot-Yakutsk Railway (around 800 kilometers [km]) connects central Yakutia with the Trans-Siberian and Baikal-Amur Railways. The construction of the railway lasted from 1985 to 2014 when the last section, Tommot-Nizhny Bestyah (on the river bank across from Yakutsk), was completed and launched. Now the regional government is looking into the development of Yakutsk as a multi-modal regional transport hub, once it is connected by all modes of transportation (Yakutsk Strategy 2032 2015).
8. A third of roads in the region are seasonal (Yakutia Safety Program 2022 2017). However, paved roads also depend on ice crossings. For example, federal roads network with hard surface have seven ice crossings over large rivers Lena, Vilyui, and Aldan (Draft Law on Advanced Delivery 2017).
9. On amendments to the federal law, "On Rules of Organization of Legislative and Executive Authorities in Regions of the Russian Federation."
10. Dredging was regularly carried out in the Lena River during 1970–1990 to ensure navigable depths (Anisimov and Kokorev 2016), but in the last 25 years was reduced to less than a fifth of previous efforts (Yakutia Water Transport Program 2036 2017).
11. Exploration of hydrocarbons, diamonds, gold, and other precious metals (State Arctic Development Program 2015–2025 2017).
12. Federal Target Program "Development of Transport System in Russia (2010–2020)," sub-program "Inland water transport."
13. Funding for modernization of the Tiksi port is yet undetermined; it has not been included into any of the current programs ("Ysia.ru" 2017).

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CHAPTER 10

Sustaining Sustainability in Whitehorse, Yukon, Canada

James Powell

Introduction

One major deficiency with the ISO approach is that it does not include specific indicators to track city-level planning; in addition, the ISO does not include specific measures of the implementation of sustainability plans. With its collection of 148 indicators, the ISO does measure a city's progress in improving its performance on the various indicators included in the international standard, but it does not provide any way to measure how much a city tries to achieve sustainability. This chapter shows how a city can use self-selected indicators to drive progress toward greater sustainability. Although the indicators that Whitehorse selected differ from those included in the international standard, there is considerable overlap.

Whitehorse, the capital of Canada's Yukon, demonstrates how a northern city can successfully plan and monitor sustainability when city leaders and the general public benefit from strong guidance, a comprehensive process, and access to funding. Few examples of successfully implemented sustainability plans can be found in the world today, and only a small fraction of those are in North America (Powell 2012). In this context, Whitehorse's sustainability planning history provides a rare instructive example of how a community's sustainability ambitions can become reality.

Four factors explain the success of Whitehorse in defining and implementing a sustainability plan. First, beginning in 2006, national

gas tax revenue funds were passed through the Yukon territorial government for use by communities that agreed to develop sustainability plans (Yukon Government 2005), laying the foundation for Whitehorse to begin preparing its first sustainability plan in 2007.

The second factor is a shared commitment to learning. The high level of community engagement in Whitehorse illustrates how the community has learned together; at the same time that professionals have learned about public values and everyday life in Whitehorse, citizens have learned about overarching frameworks for achieving progress toward sustainability (Sapountzaki and Wassenhoven 2005). Public meetings, charrettes, well-designed websites, dashboards that consolidate information for decision makers and the general public—all these contribute to consensus building and a two-way learning process.

The third contributing factor is that the sustainability plan must align with broader city planning. In Whitehorse, the plans and dashboards (with focused, results-oriented strategies, including milestones and targets for improvements) are aligned with city priorities. The fourth and final critical contributing factor involves the community's culture of acceptance of government participation in sustainability planning as a legitimate and useful state function. As a result of its attention to fostering shared learning, aligned planning, and civic buy-in, Whitehorse stands out among Arctic cities as a leader in implementing and actualizing sustainable development at the municipal level.

This chapter examines Whitehorse's process for robust sustainability planning and implementation, based on in-depth interviews, participant observations, and a review of government reports and scientific literature. We interviewed twelve experts and decision makers involved in the process, including a mayor, members of the municipal and territorial governments, and representatives from First Nations.

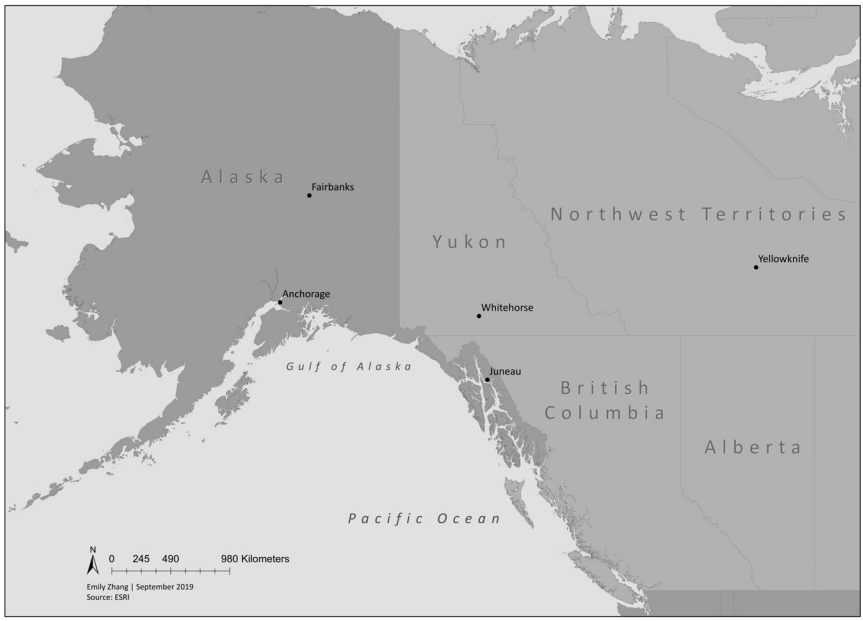
Underlying the four factors listed above, Whitehorse's success has relied on breaking down sustainability, a sometimes-nebulous concept, into smaller executable tasks without losing a systemic approach. The Whitehorse Sustainability Plan includes a vision, a list of values, and guiding principles, while the core focuses on twelve goals, each with specific targets and strategies to achieve those targets. The goals and targets are easily found on the city's website with highly readable dashboards for each of the twelve goals, and targets showing alignment with the sustainability goals. Each goal features a specific implementation approach, along with a brief synopsis of Whitehorse's jurisdiction regarding that particular goal.

Whitehorse's goals and targets are more focused than the ISO sustainability indicators laid out in the introductory chapter. As with many remote northern municipalities in Canada, the federal government provides Whitehorse with funding for services, facilities, and activities that boost its residents' quality of life in an effort to stimulate private sector activities associated with resource extraction. In contrast to many of its peers, however, Whitehorse stands out as a community that embraces sustainability and has found a way to integrate it into government policy with the support of its residents. Considering the lack of successful community sustainability indicator projects in the North and elsewhere, lessons learned from Whitehorse's success may be transferable to other cities.

The chapter starts with a short description of Whitehorse's social-ecological setting and the objectives of the study. We then review the progress that Whitehorse made between its first plan in 2002 (City of Whitehorse 2002) and its landmark Whitehorse Sustainability Plan (City of Whitehorse 2015b) in 2015. We compare those years to the three phases of sustainability planning, tracking Whitehorse's progress through each phase. We then study the Whitehorse Sustainability Plan and investigate how it has worked to build on Whitehorse's previous achievements. Finally, we will conduct an analysis using a tool in the American Planning Association's Planning Advisory Service Report 578 (PAS 578; Godschalk and Rouse 2015) and offer some discussion and recommendations for next steps.

Whitehorse's Social-Ecological Setting

In the northwestern corner of Canada lies Yukon, a territory that borders Alaska to the west, British Columbia to the south, and Northwest Territories to the east. The community of Whitehorse is situated in the wide valley of the Yukon River and the Yukon Southern Lakes Ecoregion. It is surrounded by three nearby mountains: Grey Mountain to the east, Haeckel Hill to the northwest and Golden Horn Mountain to the south (Yukon Government 2014). Whitehorse has a northern continental climate with cold, dry winters and mild, temperate summers; it is the driest city in Canada based on annual precipitation (City of Whitehorse 2010a). More than five thousand years before Whitehorse was established as a central settlement, aboriginal tribes, including the Tagish Kwan, Tlingit, Kasha, Han Gwich'in, and Tutchone Nations, used the area for food gathering, trade, and as a meeting place (City of Whitehorse 2013). The aboriginal tribes of the



Map 10.1 | *Map of Yukon and Whitehorse. Map created by Emily Zhang; published with permission.*

area moved around during different times of the year; archaeological findings confirm continual use of seasonal hunting and fishing camps. Descendants of these people are the Kwanlin Dün First Nation and the Ta'an Kwäch'än Council. Located at the head of the navigable waters of the Yukon River, and an important stop on the journey to the Klondike during the 1898 Gold Rush, Whitehorse became a settlement and transportation hub for a growing population of nonnatives (map 10.1). Once the White Pass and Yukon Railway linked Whitehorse with the Alaskan port of Skagway, Whitehorse became the center of transportation into and out of Yukon (City of Whitehorse 2013).

The City of Whitehorse was incorporated in 1950 as the capital of what was then called the Yukon Territory. In 2018 the population was 31,527; approximately 75 percent of the population are non-Indigenous peoples sharing the traditional territory of seventeen aboriginal, or First Nations, tribes (Statistics Canada 2011). The municipality of Whitehorse covers a large area of approximately 41,900 hectares, extending approximately 30 kilometers (km) from north to south and 14 km from east to west (City of Whitehorse 2013). The Kwanlin Dün First Nation and the Ta'an Kwäch'än Council are the largest landowners within the municipality.

As the largest community in Yukon, Whitehorse serves as a regional hub. Although remotely situated, the city is well connected in comparison to other northern communities, because the Alaska Highway connects Whitehorse to both Alaska and northern British Columbia. Whitehorse provides many government services and supports economic activity associated with Arctic and sub-Arctic natural resource extraction, such as mining and timber, in addition to tourism.

The city's slogan, "The Wilderness City," reflects the value its inhabitants place on Whitehorse's wilderness characteristics. Cultural and athletic events are common, and Whitehorse is well known in northern Canada and Alaska for its indoor and outdoor recreational and sports facilities. One example is the more than 700 km of maintained trails within the city limits alone (City of Whitehorse 2010a). With new facilities, including two ice rinks, a state-of-the-art fitness center, an aquatic center, and 75 km of groomed trails for cross country skiing, the community stays active and frequently hosts national and international events.

Demographics

Table 10.1 provides an overview of Whitehorse's demographics. Approximately 75 percent of the Yukon population lives in Whitehorse. The city outpaced the nation with a 7.8 percent increase in population compared with the national growth rate of 5 percent, according to the Yukon Bureau of Statistics July 2018 report and census data (Yukon Bureau of Statistics 2018a). In Yukon as well as in Whitehorse, between 2008 and 2018 the population, labor force, and employment trended upward (Yukon Bureau of Statistics 2018a). The territory's unemployment rate dropped from 7.2 percent in 2012 to 3.6 percent in 2017 (Yukon Bureau of Statistics 2018b). In 2018 the population of the territory hit a new record high of 40,483. The City of Whitehorse's population grew from 25,300 in 2008 to 31,527 in 2018, an increase of 24.6 percent. Housing has not kept pace with the growing number of residents (a problem shared with other northern urban centers), and housing costs have continued to increase dramatically in recent years ("Real Estate Market Report for Whitehorse, YT" 2016). During the third quarter of 2018 the average price of a single detached house was reported to be $475,000, an increase of $25,100 or 5.6 percent from the prior year. In 2016 the median price per home was approximately $402,000 (Yukon Bureau of Statistics 2018c).

All of our key informants indicated that the Yukon territorial and Canadian government both provide substantial funding to further

Table 10.1 | *Whitehorse by the numbers*

Category	2008 (except where indicated)	2018 (except where indicated
Total population*	25,300	31,527
Indigenous population**	3,770 (2011)	3,993 (2016)
Median age of population*	38.1	37.1
Average house price*	$322,800[4]	$475,000 (3rd quarter)
Unemployment rate*	7.6%	4.1%
Graduation rate*** (urban area—mostly Whitehorse)	68% (2013–14)	75% (2015–16)
Cost of living****		Cost of living (2019): $19.07/hr. Minimum wage: $12.71/hr.

Note: * Yukon Bureau of Statistics 2017; ** Yukon Bureau of Statistics 2017; *** Statistics Canada 2016; **** Hammond 2019.

develop and maintain Whitehorse's infrastructure. We included the six-year completion as an indicator of education. The graduation rate for urban Yukon, which includes all Whitehorse areas, has increased from 68 percent in 2013–14 to 75 percent in 2015–16 (Yukon Government 2017).

Sustainability Leadership

Canada has a long tradition of leadership in sustainability at the international and local levels. Recent trends are moving toward better integration in Canadian federal government departments with sustainability development defined in legislation and written into its mandate (Natural Resources Canada 2017).

Jurisdiction

The City of Whitehorse has responsibility for basic governmental services, including water, sewerage, garbage, recreational facilities, land development, roads, and fire control. Canada's federal and territorial/provincial governments are generally responsible for health, education, and libraries. However, the governments work together on several programs to support and fund different activities, such as sustainability planning. Unlike most other Canadian communities, Whitehorse lacks a municipal and territorial police force. The Royal Canadian Mounted Police is the only law enforcement agency.

Though the municipal and territorial governments do not fund a local police force and no such entity exists, there are some staff employed to respond to complaints.

Case Study Objectives and Methodology

The purpose of this study is to investigate how sustainability indicators and planning in Whitehorse have been and are being implemented. The research combined participant-observation, document analysis, and in-person interviews gathered in the Fall of 2017 and the Spring and Fall of 2018 (Kawulich 2005; Yin 2009). The interviews built on the author's twenty years of participation in numerous structured and unstructured meetings with members and leaders of the Whitehorse City Council. The author's access and established rapport garnered insight into local organizational culture and political processes and provided valuable context for government reports about sustainability plans and monitoring. In-person interviews were conducted with local officials and experts in an effort to provide additional context and to augment and confirm local data and reports.

The author interviewed twelve individuals—the mayor and two members of the Whitehorse City Council, two representatives from First Nations, and seven government officials from the City of Whitehorse and the Yukon government who worked on sustainability issues—in person in September 2017 and September 2018. The interviewees were selected based on their expertise and availability and their match with one of the following criteria:

- Current city or territorial employee with a role in city planning or sustainability issues such as recycling, energy, conservation, or climate change
- Current employee in a First Nations organization with a role in natural resources or sustainability planning

In order to learn about the major local issues in Whitehorse and to learn about how sustainability indicators were implemented in the municipality, the author asked each interviewee six open-ended questions (table 10.2). The interviews lasted approximately one hour, and all interviewees answered all of the questions. The answers were recorded.

As part of our analysis, we drew from the American Planning Association Planning Advisory Service Report No. 578 (PAS 578) titled *Sustaining Places: Best Practices for Comprehensive Plans* (Godschalk

Table 10.2 | *List of interview questions*

1. What do you think are the top five issues for Whitehorse?
2. Who has the most power over the key decisions in the city (e.g., local government, companies, federal government, First Nations, citizens, others)?
3. Is the city making sustainability plans for the future? Who is leading this process?
4. Does the local education system give students the knowledge and skills they need to continue living in the city?
5. How successfully is the city integrating renewable energy into its overall energy supply?
6. Are there indicators for measuring sustainability goals?

and Rouse 2015). In 2016 the American Planning Association published one of the few available standards for evaluating sustainability planning as part of local planning processes. The standards include six principles, two processes, and two attributes. Collectively, the American Planning Association considers these ten components as guidance for how sustainability should be integrated into comprehensive planning. The two required processes are authentic participation and accountable implementation. The best practices in these categories are used as measures to evaluate the development and implementation of sustainability plans.

Origins of Whitehorse's Sustainability Planning and Indicators

Sustainability planning and indicators (goals and targets) in Whitehorse can be traced back nearly fifty years to the city's first general plan, which was a land use plan adopted in 1976. In 1986 the general plan was replaced with the first Official Community Plan (OCP; City of Whitehorse 1987), as directed under the Yukon Municipal Act (Yukon Government 1986). The OCP was adopted under City of Whitehorse Bylaw 86-50, that states, "Future development and redevelopment within the municipality may be carried out, having regard to public input to consideration of orderliness, economy, convenience and physical, social and environmental consequences . . . on the basis of public input and of survey and studies" (City of Whitehorse 1987: 3).

The OCP is a policy document that provides an overall vision for the City of Whitehorse. The OCP also serves as a tool to guide decisions related to land development as it relates to residential and

commercial projects, industrial activity, transportation infrastructure, and the environment (City of Whitehorse 2013).

Three Phases of Sustainability Planning and Indicators

Since 1986 major advances toward sustainability implementation have taken place in Whitehorse in three phases: (1) vision and principles, (2) issues and measures, and (3) measures and monitoring. Table 10.3 traces the evolution of the city's sustainability plans, beginning in 2002, when city leaders articulated a general vision and goals for sustainability. This vision laid the groundwork for the measurable sustainability goals and targets (indicators) detailed in the 2015 Whitehorse Sustainability Plan. The seven plans developed since 2002, along with the 2016 monitoring report (listed in table 10.3), all focused on sustainability. These plans required substantial commitment and leadership from the city, funding from the Yukon government, and public interest and pressure.

In 2007 the city hosted a four-day sustainability charrette to engage the public in developing the Strategic Sustainability Plan. The planning documents show that the visions, values, themes, and goals had not changed significantly over time but had gradually become more focused. The visions included in the 2002 OCP led to strategic planning, with measurable goals and action items set out in the 2015 Whitehorse Sustainability Plan, and, most recently, the 2016 Whitehorse Sustainability Plan Monitoring Report.

Phase 1: Vision and Principles

Although the OCP had been amended several times over the years, the first time a vision statement for sustainability was included was in the 2002 plan, which listed seven core principles of sustainability. These were broad and aspirational, without measurements or targets, and laid the groundwork for future sustainability goals and measures. The seven principles are listed in table 10.4.

When these principles were drafted in 2002, Whitehorse lacked blueprints or systematic guidance for developing and implementing holistic objectives such as quality of life. Because these goals reached beyond the scope of extant formal institutions, they had the unintended consequence of facilitating the appearance of informal drivers promoting sustainability, such as cultures of collaboration, local leadership, and partnerships—all considered necessary for successful

Table 10.3 | *Phases of Whitehorse's sustainability planning*

Phases of sustainability planning and implementation	Planning and sustainability policy documents	Major contents
Phase 1 Vision and Principles	2002 Official Community Plan (OCP)	The first time a sustainability vision with seven principles was included in a city planning document. The OCP, which is periodically updated, is largely a land use document reflecting community aspirations.
Phase 2 Integrated Framework: New Deal for Cities and Communities	2007 Integrated Community Sustainability Plan (ICSP)—a guide to infrastructure investment.	Funded under the federal Gas Tax Agreement 2005–15, the plan continued to focus on areas of emphasis. Ten priority areas were targeted for action. Based on community consultation, the plan proposed 87 actions, with a goal to complete 75 actions by 2014.
	2008 Strategic Sustainability Plan—Engaged the public on values and issues beyond infrastructure.	Building on the ICSP, the city adopted its Strategic Sustainability Plan and hosted a four-day sustainability charrette.
Phase 3 Measures and Monitoring	2010 Official Community Plan (OCP)—Amended	"Aims to integrate sustainability into City operations and decision-making." (OCP 2010: 7) Wilderness highly valued, with nearly 60% of the land within the city boundary reserved for greenspace.
	2010 Sustainability Achievements, Sustainability Trends	Seven sustainability goals with an analysis of trends.
	2011 and 2012 Strategic Sustainability Plan Highlights Summary	Progress report on seven key principles.
	2015 Whitehorse Sustainability Plan 2015–50	Transformed the 2008 Strategic Sustainability Plan into a city-wide plan reflecting aspirations of the entire community.
	2016 Whitehorse Sustainability Plan Monitoring Report	Report on 2014–15 progress toward targets.

Note: Three phases categorize the development of sustainability planning and indicator development using the City of Whitehorse's planning documents. The table lists each phase with relevant documents and dates and a short description.

Table 10.4 | *Seven principles of sustainability*

1. Management of growth for the long term	Consider the long-term impacts of all land-use decisions. Ensure short-term decisions do not compromise long-term intent. Make sure services and amenities are available close to home.
2. Environmental stewardship	Grow in harmony with the natural surroundings and ecosystems. Preserve all important and unique natural features, including watercourses, landforms, and habitats.
3. Social responsibility	Ensure that all residents live in a safe community and have access to affordable housing, educational opportunities, and recreational facilities.
4. Maintain and enhance the quality of life	Focus on creating a high quality of life for residents. Consider the visual, social, environmental, and community impacts of development.
5. Provision of trails and recreational opportunities	Recognize the importance of trails for both motorized and nonmotorized modes of travel. Provide for the expansion and enhancement of trails and ensure that trails and park spaces are safe and accessible by all.
6. Economic diversity and vitality	Create a diverse, flexible, and vibrant local economy that provides sustainable employment.
7. Involve the community	Provide a process for involving residents in land use and community development decisions. Build consensus on actions affecting the city's future.

Note: Modified from Whitehorse's 2002 OCP (City of Whitehorse 2002).

sustainability planning (Gattinger, Saint-Pierre, and Couture Gagnon 2008). Since sustainability is not mentioned in the Yukon Municipal Act, jurisdiction over the cultural domain of sustainability was shared; this jurisdictional ambiguity and a lack of formal planning guidelines opened the door for sustainability policy and planning innovations.

Phase 2: Integrated Framework

The next major phase of sustainability planning occurred as part of a national effort to address infrastructure funding needs. Canadian federal policy has recognized the growing need to respond to global, environmental, and demographic challenges through actions that are "local and shaped by a strong sense of place" (External Advisory Committee on Cities and Communities 2006: 10). Like most rural communities across Canada, Whitehorse's infrastructure is aging, and limited means are available to raise the money necessary to respond to the infrastructure

deficit. In response, in 2007, with the Government of Yukon providing substantial impetus and funding, the City of Whitehorse adopted the Integrated Community Sustainability Plan (ICSP). The ICSP was shaped according to the process set out by Canada's Gas Tax Revenue Fund, which provided revenue from gas taxes through a Gas Tax Agreement between Whitehorse and Yukon (Yukon Government 2005). That agreement was part of a national effort referred to as a "New Deal for Cities and Communities," designed to respond to the increasing infrastructure deficit and the inability of municipalities alone to raise the necessary funds to respond (City of Whitehorse 2009).

The New Deal for Cities and Communities grew out of the Canadian federal government's External Advisory Committee on Cities and Communities, which, in 2006, put forward a vision and approach for sustainable development for cities and communities that was based on a four-pillar framework (External Advisory Committee on Cities and Communities 2006), on which ICSPs were to be built.

Yukon First Nations, specifically the Kwanlin Dün First Nation and the Ta'an Kwäch'än Council, as well as the City of Whitehorse, were funded for planning and infrastructure. The Gas Tax Agreement directed the city to develop a long-term plan, to be prepared in consultation with community members, that would set out means for the community to realize sustainability objectives for the environmental, cultural, social, and economic dimensions of its identity (Yukon Government 2005).

In a background paper intended to furnish both provinces and municipalities with information on ICSPs, the federal government clearly stated its intentions with regard to this process: the requirement for municipalities to develop ICSPs was designed to accelerate the shift in local planning and decision making toward a longer-term, more-quantifiable, and more-participatory approach to achieving sustainable communities. ICSPs have been identified as a means to help cities, communities, and First Nations effectively plan and manage their resources to achieve identified outcomes, deliver services, and address priorities within an integrated framework encompassing the economic, environmental, social, and cultural dimensions of community sustainability (Yukon Government 2005: 4–5).

The Whitehorse ICSP included a list of seven values (sense of community, quality of life, nature and beauty, contributions of the First Nations, leadership, vibrant arts and local business); these values were aligned with goals and measures of success. The measures of success represented the first such list spanning sustainability areas, or domains. The measurements ranged from activities and general

objectives, such as "Increase cultural awareness" and "Build a new fire hall" to Leadership in Energy and Environmental Design (LEED) standards. Several of the measures suggested increasing or decreasing activities, such as "Increase transit service" or "Implement a water metering program." However, there were no targets or quantitative measures set in the plan.

In 2008 the City of Whitehorse decided to develop a Strategic Sustainability Plan that would build on the work done for the ICSP. As part of this effort, the city hosted several visioning and charrette exercises to develop a vision and principles beyond basic infrastructure, which had served as the focus of the ICSP. The city, with input from the general public, developed and included in the 2008 Strategic Sustainability Plan the following vision statement: "Whitehorse will be a well-planned self-sustaining community that is a leader in energy conservation and innovation that maintains and conserves wilderness spaces for future generations. Whitehorse will continue to strive for a better quality of life that is reflected in its vibrant economy and social life" (City of Whitehorse 2008: 8).

This plan advanced the original sustainability principles in the 2002 OCP (see table 10.4) by modifying them into seven core principles—thriving environment, community development, leadership, diverse local economy, equity, cultural identity, and education—each with related goals (see table 10.5; City of Whitehorse 2010b).

Phase 3: Measures and Monitoring

In 2010 the Strategic Sustainability Plan was integrated into the 2010 Official City Plan; at the same time, the city published the Sustainability Achievements and Trends report (City of Whitehorse 2010b). This report was the first major sustainability report on progress in Whitehorse. After more than a decade of sustainability planning, there were many clear and measurable indicators of success; progress toward meeting the goals established in the sustainability planning documents was clearly being made. Many benchmarks that had been established in the course of sustainability planning (see table 10.5), and significant progress toward those goals, had been accomplished. Impressively, the sustainability achievements in Whitehorse occurred in several areas, going well beyond energy conservation and recycling. Consistent with the integrative nature of successful sustainability planning, the city's program spanned departments and organizations while examining the entire system.

Table 10.5 | *Seven core principles and achievements*

Seven core principles	Goals	Achievements
Thriving environment	Achieve community waste targets	A goal is set to achieve zero total waste by 2040, with 32% diversion in 2013. Total landfill diversion increased from 1,200 metric tons in 2000 to 3,500 tons in 2014; curbside diversion rates reached 42% in 2009.
Community development	Prepare local climate change adaptation plan	Responding to climate change is one of the City of Whitehorse's twelve sustainability goals. Greenhouse gas (GHG) emissions reduced to 2014 level and holding steady. The Yukon government released its Climate Change Action Plan in 2009 and updated it for 2016–18. A goal is set to increase renewable energy use, with new solar on all city buildings in 2019.
Leadership	Reorganize city admin structure to deliver sustainable services	The 2010 OCP addresses restructuring to include sustainability in all operations, to be facilitated by a sustainability project manager hired to work with all departments to integrate sustainability into city operations.
Diverse local economy	Develop an economic strategy	The 2010–11 Economic Development Action Plan is completed. The city begins to develop an integrated branding initiative to be completed in 2011.
Equity	Ensure universal accessibility	All public service areas of city facilities are now universally accessible. Barrier Free Access construction is now implemented in all new city buildings.
Cultural identity	Increase use of trail network	Eleven new trailheads are established in 2010. Trail signage and features are completed on hiking and mountain bike trails; 10 km of new trails are constructed and 15 km of existing trails enhanced.
Education	Sustainability education	Community consultations, such as charrettes, provide opportunities for public education and exchange. City environmental grants continue to support community environmental initiatives.

Source: Based on City of Whitehorse 2010b.

Whitehorse Sustainability Plan

The City of Whitehorse Sustainability Plan 2015–50 replaced the city ICSP and moved sustainability planning forward by updating and refining the sustainability documents published by the city over the preceding thirteen years. The Whitehorse Sustainability Plan is a comprehensive and highly readable strategic planning document that includes a vision, values, themes, and principles (see table 10.6). This plan also describes the four-part process that was used to develop it. First, gaps and strengths in thematic plans such as the solid waste plan were considered. Second, staff, stakeholders, and the general public were consulted about the vision statement and preliminary goals and targets. Third, staff was consulted about refining the goals to ensure targets would be based on best practices. Finally, partners outside city government, including the public, were asked to help achieve the goals. These steps clearly demonstrate Whitehorse's successful integration of sustainability planning into its city government and active engagement with the public (City of Whitehorse 2015b).

Table 10.6 | *Values, themes, and principles of 2015 Whitehorse Sustainability Plan*

Plan components	Description
Vision	"Whitehorse will be a well-planned, self-sustaining, innovative community that leads in management and conservation of wilderness, energy, and resources for the future. Whitehorse will strive for a good quality of life for all, a stable economy, and a socially diverse community."
Seven values	Sense of community Quality of life Nature and beauty Contributions of First Nations Leadership Vibrant arts Local business
Themes	Lead through partnerships Citizen stewardship Integrate sustainability into city business Focus on existing assets Stay the course (use the plans) Continuous learning—move toward measuring progress, with clear, ambitious, long-term goals.
Principles	Fundamentals, decision making, and process

The Whitehorse Sustainability Plan's Twelve Goals, and Strategies with Targets (Sustainability Indicators)

The Whitehorse Sustainability Plan features twelve goals and strategies (listed in table 10.7). The strategies for each goal were developed collaboratively by staff, the general public, and stakeholders. Forty action-associated targets (indicators) were included in the Whitehorse Sustainability Plan as a method for measuring progress toward sustainability. For example, one of the goals, "Efficient low-impact transportation," is accompanied by a target (indicator) to "Increase active transportation and transit mode share," with milestones set for 2020, 2030, and 2050 at 35 percent, 48 percent, and 55 percent, respectively (City of Whitehorse 2015b: 18). A variety of specific strategies for operationalizing each goal and target are listed in an appendix to the plan. These goals and targets, with specific activities, also delegate oversight of the plan to a governing body at the city. The sustainability targets encompass all domains of sustainability. In order to keep the public and experts alike informed and engaged, the Whitehorse Sustainability Plan also features a communications plan featuring a webpage with easily understandable dashboards (City of Whitehorse 2015b: 29–30).

The city has clearly articulated the limitations of the plan. For example, the text includes the following caveat on data quality and monitoring: "Monitoring is still in its early phases. In general, data that is reliable, available, and specific to Whitehorse is limited. Obtaining good information, both pertaining to City operations and in partnership with other data collectors for topics outside City jurisdiction, remains an important task" (City of Whitehorse 2016: 1).

Table 10.7 | *Whitehorse Sustainability Plan: Twelve sustainability targets (indicators)*

Strong downtown and livable neighborhoods	Efficient low-impact transportation	Green building and infrastructure	Healthy environment and wilderness
Energy and greenhouse gas (GHG) reduction	Dynamic and diverse culture, heritage, and the arts	Social equity, affordable housing, and poverty reduction	Connected, engaged, participatory community
Safe and healthy community	Diverse local economy	Zero waste	Resilient, accessible food system

It took many years for Whitehorse's community sustainability planning to get to this point. The city's milestones and achievements may be familiar to some cities and instructive for others. The key components of the city's programs evolved over time with strong top-down direction from city staff, elected officials, and experts. These were largely enabled and supported by Yukon government funding under the gas tax (Yukon Government 2013). It is questionable whether the impressive sustainability efforts would have been achievable if not for the funding provided by the Yukon government. The city integrated the top-down approach with a bottom-up approach by engaging the general public and stakeholders at several town hall meetings and charrettes. The integrated top-down/bottom-up approach provides extra benefits of engaging the community to support sustainability policy (Fraser et al. 2006). The long timeline for success, with slow plans and targets (indicators), reflects the cumbersome and significant time necessary for planning processes and the plodding pace of institutional change found in any government system. It took sixteen years for Whitehorse to move from sustainability vision statements to measurable sustainability indicators (goals and targets). As sustainability plans were developed and adopted, it became clear to the city that the action goals and targets would become realized only by hiring staff to guide the work. Sustainability was then institutionalized by the creation of a new position in the Planning office, which is now referred to as the Planning and Sustainability office. The Planning and Sustainability office prepared a comprehensive list of sustainability indicators, which reach across all programs, along with a website with easily readable dashboards for each of the sustainability targets shown in table 10.7 (City of Whitehorse 2019).

Highlights from Whitehorse's Sustainability Goals and Targets

A sample of five of Whitehorse's twelve sustainability goals and targets (indicators)—zero waste, green building and infrastructure, diverse local economy, resilient and accessible food systems, and connected, engaged, participatory community—illustrates the city's significant innovation in charting and tracking its progress toward its specific sustainability goals. Based on in-person interviews and government documents, several aspects of Whitehorse's goals and targets bear particular significance for the community.

Goal: Zero Waste

Some of the unique and interesting aspects of Whitehorse's sustainability goals and targets (indicators) have to do with the way progress is measured. Whitehorse's sustainability goals include targets that exceed national objectives, in acknowledgement of the community's identity as "The Wilderness City." The goal of zero waste is ambitious, given the city's remote location and limited opportunities, but it aligns with the aspirations and concerns of Whitehorse's current mayor (in-person author interview with Dan Curtis, 27 September 2018). When asked to describe the issue most important to him, he replied, "Of all the issues, solid waste keeps me up at night thinking about what is the solution." One of the major reasons for Mayor Curtis's top concern is the cost of the current and future liability for managing and closing the city's landfill facility. Each year, the city is legally obligated to set aside funds for the landfill closure liability fund (City of Whitehorse 2018a). The funds are directly correlated with the total volume of waste going into the landfill. The estimated cost to properly close the landfill is $13 million (US) (City of Whitehorse 2018b). Other Canadian cities, such as Edmonton, Halifax, and Nanaimo, are models for Whitehorse, as they are diverting more than 50 percent of their waste. Whitehorse has developed several initiatives to increase its diversion rate by recycling and composting. By developing specific goals and targets for each of the waste types (e.g., organics, glass, cardboard, plastics, paper, metals), the city provides specific information and knowledge necessary for reaching the higher diversion rates. As a result of this work, recycling diverted more than 3,500 metric tons of paper, cardboard, plastics, tin, and glass in 2015 (City of Whitehorse 2018b). The city composting program has also expanded since 2008, when the city started a curbside organic waste collection program. Now, the city compost is being sold; as of April 2017, the city compost is listed by the Organic Materials Review Institute, which means people can use it in organic crops, gardens, and operations (City of Whitehorse 2018b). City solid waste and planning officials agree that having goals and targets has contributed to increases in waste diversion from the landfill. As one told me, "In general, having a [firm] goal identified in the 2015 Solid Waste Action Plan contributed to waste diversion in the area of cardboard and commercial waste."

Table 10.8 | *Green building and infrastructure: Targets and progress made*

Target	Measure	Progress
City-owned buildings: Make new buildings 50% more efficient than the National Energy Code (NECB)	Achieve 50%	The new Operations Building will be 80% more efficient than the NECB goal. The new fire hall will be 50% more efficient.
City-owned buildings: Make building retrofits with a 20-year or longer lifespan 30% more efficient than the NECB	Achieve 30%	Modeling for upcoming renovations to city hall and transit building are not available.
New buildings in Whitehorse to be 30% more efficient than the NECB, National Building Code, or will achieve comparable targeted EnerGuide Ratings	Change requirements by 2029	No progress
Reduce per capita water consumption	10% decrease by 2020	Per capita water consumption has held steady at approximately 450 liters per day since 2014.
Manage all infrastructure, buildings, and natural assets in asset management system	90% completion by 2020	Asset management continues at the city.

Source: City of Whitehorse Sustainability Plan 2015–2020, p. 21.

Goal: Green Building and Infrastructure

Whitehorse has made progress toward the goals for green building and infrastructure and, in some cases, has exceeded goals and expectations. Three of the targets for building standards far exceed the National Energy Code, which is particularly impressive for a northern community with historically high heating costs. Table 10.8 lists the targets and progress made.

Goal: Diverse Local Economy

As Yukon's capital city, Whitehorse is the service center for all levels of government in the territory. The single highest employer in Whitehorse is government (public administration) with nearly 24 percent of the workforce working in territorial, municipal, First Nations, or government services. (Yukon Government 2016). While the

community enjoys substantial employment and associated economic benefits from public sector jobs, diversifying the local economy is a major sustainability goal. The Sustainability Plan states three targets for measuring economic progress: (1) maintain a long-term financial plan, (2) increase the economic diversity index, and (3) increase the number of business licenses (City of Whitehorse 2019). Given that government employees make up a large share of Whitehorse's workforce, the goal of increasing private sector jobs is important for the sustainability of the city and region. One of the growth areas, wilderness recreation, continues to expand, and now attracts hundreds of thousands of independent travelers each year.

Goal: Resilient and Accessible Food Systems

As is true in other northern economies, a major barrier to quality of life and sustainability is food security, so it is no surprise that this issue is receiving increasing attention from northern communities such as Whitehorse and Fairbanks (table 10.9). The Fairbanks North Star Borough recently identified food security as one of its top three sustainability issues. With more than 95 percent of their food imported, most northern remote communities are food insecure (lacking access to affordable, acceptable, and adequate food to meet their daily needs and preferences; Kassie et al. 2016), despite the availability of subsistence resources. Whitehorse is no exception. In 2012, more than 17 percent of Yukon households were food insecure. Northern urban communities are even more dependent on imported foods than northern rural communities. Several northern urban and Arctic communities are currently developing indicators for measuring

Table 10.9 | *Production, processing, distribution, and sales of local, healthy food to all residents*

Target	Measure	Progress
Increase consumption of local food	Set targets	Metric to be determined
Increase number of community garden plots	35% increase by 2020	Five neighborhoods or organizations have community gardens, up from two in 2014
Increase amount of finished compost produced by the city each year	10% increase by 2020	2,457 tons of raw compost was collected in 2017, up from 2,222 ton in 2014

Source: City of Whitehorse Sustainability Plan 2015–2020, p. 37.

food security; some are receiving assistance from the federal government for food security initiatives, including hoop farms. As communities build their capacity to produce a small percentage of their own food, it could generate jobs and fresher food, and help diversity the economy. Citizen engagement has been an important feature of the development of this goal, with focus groups, surveys, and city meetings held in 2016 and 2017 (City of Whitehorse 2015a).

Whitehorse's Community Economic Development Strategy 2015–20 further contributes to the resilient and accessible food systems goal by identifying facilitation of "the development of an agriculture and food production strategy within the city and surrounding area" as one of eight focus activities (City of Whitehorse 2015a: 5). Progress toward food security goals is being helped along by the increase in availability of compost generated locally, an example of the kind of synergies that work to advance multiple sustainability goals (Kenny 2018).

Goal: Connected, Engaged, Participatory Community

The connected, engaged, participatory community goal in the Whitehorse Sustainability Plan seeks to increase civic engagement, agency, and empowerment. This goal and its targets (indicators)

Table 10.10 | *Targets for connected, engaged, participatory community*

Target	Measure	Progress
Increase the number of neighborhoods with active and engaged community associations.	35% increase by 2020	7 community associations are now registered in good standing under the Societies Act, up from 5 in 2014.
Increase number of city partnerships on special events and joint projects.	5% increase by 2020	City partnerships numbered 38 in 2017, up from 35 in 2014.
Increase percentage of population that regularly volunteers.	5% increase in volunteerism by 2020	Information not yet available.
Increase number of new, unique, or annual opportunities for public participation.	3% increase by 2020	Public engagement events dropped to 47 in 2017 from 60 in 2014.
Increase direct engagement with hard-to-reach audiences (% of major consultative processes with at least one direct opportunity).	10% increase by 2020	Not available.

Source: City of Whitehorse Sustainability Plan 2015–2020, p. 29.

feature very innovative and nontraditional metrics. The targets are summarized in table 10.10.

Each of the targets (indicators) in table 10.10 has a corresponding goal set for 2020, 2030, and 2050.

One interesting feature of the Whitehorse community is its citizens' high level of trust in the government and public process in general. This could influence how the general public might receive sustainability planning and indicators. When asked who makes decisions in Whitehorse, our interviewees typically responded, "The people make decisions." Considering a large percentage of the citizens are government employees, this is not entirely surprising. Political polarization was not mentioned among our interviewees as a major issue in Whitehorse.

The contrast with the US context is clear. The Fairbanks North Star Borough's community leadership under former mayor Karl Kastle included a new style of a town hall meeting called Sandbox, wherein the mayor used live polling to get a sense of public opinion and as a tool in engaging the public in discussion (Engman 2017). As a threat to sustainability, political polarization is an issue that needs attention in sustainability planning so that greater unity may be achieved as a facilitator of progress toward sustainability.

Whitehorse Sustainability Monitoring Report 2016

The 2016 Whitehorse Sustainability Plan Monitoring Report exemplifies the city's strong commitment to monitoring its progress. The Whitehorse Sustainability Plan was adopted by the city in 2015 and is an update of the 2008 Strategic Sustainability Plan. It measures twelve community-wide goals, with forty associated targets that serve as a measure of progress toward sustainability goals (City of Whitehorse 2016). Dashboards the city is using to track goals and targets include a short description of the goal, with one to eight targets for each goal, and additional information displayed graphically along with information about trends.

The dashboards used in the monitoring report are also used on the Whitehorse Sustainability Plan website, which is administered by the city's Department of Planning and Sustainability (figure 10.1). The dashboards on the website present more detail, including specific quantitative measures with benchmarks. They also display progress made toward each benchmark. A rationale for each goal is provided, as is information about the city's jurisdiction; its authority to effect

Figure 10.1 | *Sustainability dashboard. Screenshot by the author.*
Note: Screenshot of the zero waste goal, one of Whitehorse's twelve sustainability goals, showing target (indicator) measures, progress, and other information on the Whitehorse Sustainability Plan, from the website (City of Whitehorse 2019).

change on an issue is rated as high, medium, or low. Progress is also shown with a graphic of a round gauge showing the current status of each goal, with a pointer indicating weak, fair, moderate, or good.

Analysis, Next Steps, Discussion

The American Planning Association's PAS 578, titled *Sustaining Places: Best Practices for Comprehensive Plans* (Godschalk and Rouse 2015) was used in part as a method for evaluating the level of implementation of the Whitehorse Sustainability Plan. Ten of the best practices under the American Planning Association's accountable implementation component were used as a reference or checklist to evaluate how Whitehorse's sustainability implementation was done. PAS 578, one of the few available reference documents with standards for sustainability in comprehensive plans, was published in 2015 (Godschalk and Rouse 2015). The standards include six principles, two processes,

and two attributes. The American Planning Association considers these ten components collectively as guidance for how sustainability should be integrated into comprehensive planning.

The American Planning Association considers implementation of planning as a set of actions that carry out the proposals of a plan over time. PAS 578 ties the goals and proposed actions to defined timetables, activities, budgets, and agencies; reports their effectiveness to the public; and revises the plan based on the reported findings (Godschalk and Rouse 2015).

Traditionally, comprehensive plans have been open to criticism because they usually do not connect goals and policies to actual implementation, with the occasional exception of revising zoning and development regulations (American Planning Association 2016). By contrast, accountable implementation weaves the plan into the daily activities of the local jurisdiction and its various departments, including budgeting and capital program funding (American Planning Association 2016). Figure 10.2 shows ten actions listed in PAS 578 that must be taken to ensure a sustainability plan is implemented (see Godschalk and Rouse 2015 Appendix B for definitions).

Applying the list in figure 10.2, shows how well Whitehorse has implemented its sustainability plan. Overall, Whitehorse has taken most of these actions. For example, addressing 8.1 and 8.6, the Whitehorse Sustainability Plan includes a highly readable table for each of the twelve sustainability goals; the table features targets, measures with benchmarks, and progress updates along with an appendix for additional specific actions that could help achieve the goals (see figure 10.1). Regarding 8.2, 8.3, and 8.5, funding for implementation is generally provided with revenue from the federal gas tax that is specifically designated for community sustainability. The capital budget is linked to the sustainability plan. The interagency cooperation recommended in 8.4 is foundational to the sustainability plan's origin; funded by Government of Yukon and requiring First Nations cooperation, sustainability planning in Whitehorse has necessitated a large polycentric approach from the outset. Municipal, territorial, First Nations, and nongovernmental organizations have all played important parts in the Whitehorse Sustainability Plan.

Whitehorse has also accomplished the monitoring and reporting recommendations of PAS 578 (8.7 and 8.8; Godschalk and Rouse 2015); since 2002, the sustainability plan has been reviewed, refined, expanded, and updated. Reports have also been published for public review; the 2010 achievement reports and the 2016 monitoring report demonstrate Whitehorse's commitment to monitoring and reporting.

8. Accountable Implementation
8.1 Indicate specific actions for implementation.
8.2 Connect plan implementation to the capital planning process.
8.3 Connect plan implementation to the annual budgeting process.
8.4 Establish interagency and organizational cooperation.
8.5 Identify funding sources for plan implementation.
8.6 Establish implementation indicators, benchmarks, and targets.
8.7 Regularly evaluate and report on implementation progress.
8.8 Adjust the plan as necessary based on the evaluation

9. Required Attributes:
9.0 Consistent Content
10.0 Coordinated Characteristics

Figure 10.2 | *Accountable implementation factors. Created by the author.*
Source: Godschalk and Rouse 2015, Sustaining Places: Best Practices for Comprehensive Plans PAS Report 578, American Planning Association. Retrieved 6 January 2019 from http://www.joslynutc.org/apa_sustaining_places.pdf.

The City of Whitehorse has done exceptional work in its approach to integration with existing plans and consistent formatting, use of websites, and user-friendly language. All of these approaches address 9.0 and 10.0, which require consistency across plan subcomponents, transparency, and multiformat accessibility.

Next Steps for Implementation

In-depth insights offered by city officials have provided a balanced critique of the utility of Whitehorse's dashboards and the city's efforts to institutionalize sustainability planning and indicators. At least three specific strategies have been deployed to maintain progress toward the sustainability goals in a variety of city governance processes and policies. The first strategy is to require that projects in the city's capital budget support the goals in the Whitehorse Sustainability Plan. Second, biannual city environmental grants require applicants to demonstrate how their projects will support the Whitehorse Sustainability Plan's goals; this initiative helps keep the sustainability plan relevant to interest groups and the general public. Third, the sustainability goals have been integrated into the OCP since 2007. As the most important ongoing planning document, the OCP retains and dovetails with sustainability goals.

The Whitehorse Sustainability Plan could be strengthened by increasing staffing; this would accelerate implementation of the many sustainability goals and help the city reach its targets. However, for a small city of less than thirty-five thousand people, it is unusual to even have environmental coordinators with sustainability planning and implementation as part of their portfolios. In order to monitor progress of the many sustainability goals, more staff are needed. Also, access to the sustainability plan and its goals could be improved by reducing the number of layers of webpages a viewer has to browse to find information; though sustainability information is clearly presented, website accessibility needs to improve. Finally, it does not appear that the city conducts formal educational programs on its sustainability goals. Integration of the sustainability program into existing primary and secondary school curriculum and short programs for the general public would enhance the exchange of knowledge among members of the public, other stakeholders, and the city.

Factors for Successful Sustainability Implementation

Preconditions for implementing sustainability plans and indicators are becoming more apparent as more cities are developing sustainability plans and addressing the challenges of implementation. Though full implementation of a sustainability plan is rare, it can be achieved if the right factors or conditions exist. Based on this Whitehorse case study and research conducted in other cities, five general characteristics have emerged as prerequisites for implementation of sustainability plans and effective use of indicators.

The first characteristic is a shared commitment to learning. The high level of community engagement in Whitehorse illustrates how the community has learned together; as professionals have learned about public values and everyday life in Whitehorse, citizens have learned about overarching frameworks (Sapountzaki and Wassenhoven 2005) for achieving progress toward sustainability. Public meetings, charrettes, well-designed websites, dashboards that consolidate information for decision makers and the general public: all of these things contribute to consensus building and two-way learning processes.

A second critical contributing factor is that the sustainability plan must align with broader city planning. In Whitehorse, the plans and dashboards (with focused, results-oriented strategies, including milestones and targets for improvements) have been properly aligned with city priorities.

The third critical contributing factor involves the community's culture of acceptance of government participation in sustainability planning as a legitimate and useful government function.

The fourth characteristic involves accessible and highly readable planning documents.

Finally, funding and resources must be made available, especially to maintain a dedicated office and staff tasked with implementation and funding.

Discussion

Sustainability definitions, holistic approaches, and long-term goals may sometimes seem to be at odds with the immediate tangible needs and outcomes of local stakeholders. Government officials, researchers, and academics have an opportunity to initiate a two-way learning process to overcome what has proved to be a wicked problem of failed consensus building around sustainable development and planning. Whitehorse met this challenge with regular planning activities that include public engagement in combination with highly readable and synthesized documents.

The most striking aspect of Whitehorse's sustainability planning and indicators effort is the relationship between the city's copious and robust sustainability plan, the monitoring plan, and the city council's annual priorities, and the integration of the plans and priorities into Whitehorse's programs and projects.

Each year, Whitehorse City Council reviews the Sustainability Plan at its city council retreat; every two years, the Official Community Plan is updated in reference to the Whitehorse Sustainability Plan's long-term 2050 vision. From the beginning of Whitehorse's sustainability journey (represented by Official Community Plan in 2002) (City of Whitehorse 2002), we see an integrated approach that includes all municipal programs and issues. Although sustainability's major tenet is to use a systems and integrated approach, cities around the United States often fall back on focusing narrowly on energy and efficiency, working from an incomplete vision of sustainability (Powell 2012). Whitehorse avoids this, and does so while ensuring the public stays informed and involved.

Conclusion

As a result of its attention to fostering shared learning, aligned planning, and civic buy-in, Whitehorse stands out among Arctic cities as a leader in implementing and actualizing sustainable development at the municipal level. One Whitehorse city official interviewee mentioned that, beyond a commitment from city staff and management, long-term planning for sustainability will require an ongoing push from the public and endurance from staff.

Whitehorse's sustainability planning and implementation serves as a model for other communities in northern and Arctic urban communities. Sustainability planning efforts may not have occurred so successfully, however, without the city's leadership and its partnerships with and substantial support from the federal and regional governments. Many cities around the globe and in the Arctic use comprehensive sustainability plans and have lists of targets or sustainability indicators. However, very few communities successfully implement their sustainability plans (Powell 2012). After reviewing several other northern cities in North America and in northern Europe, Whitehorse's implementation of its sustainability plans and indicators stands out as most impressive. The characteristics of Whitehorse's successful sustainability planning and indicators program may help guide other cities that are considering putting in place an effective, active, and measurable local sustainability effort.

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CONCLUSION

Next Steps for Measuring Arctic Urban Sustainability

Robert W. Orttung

Introduction

This book has sought to further our understanding of Arctic urban sustainability in several ways. First, it applied various metrics defined by ISO 37120, the international standard for measuring urban sustainability, to a variety of Arctic cities to see if the metrics are applicable and useful. Second, it provided an overall critique of the standard; some chapters in this book offered extensions to the current standard that can be used in conjunction with the current ISO metrics to increase our understanding of urban sustainability in Arctic conditions. Third, the chapters laid out a considerable amount of case study material about the Arctic cities themselves. Urban studies in the Arctic is a relatively young field and this book hopefully will deepen our knowledge about sustainability processes in some of the most prominent Arctic cities. The chapters use the ISO as a starting framework but include other extensive rich data to fill in the gaps left by the ISO itself. As Vera Kuklina and Natalia Shishigina's chapter put it, we tried to include the creativeness and beauty of the Arctic cities as well as the raw data. This concluding chapter will tie together the most important findings and lay out areas for future research.

ISO 37120 provides a wide-ranging overview of urban sustainability and brings together data on everything from economic indicators to wastewater management. Applying the metrics in the standard make it possible to compare policies and outcomes across cities in

countries as diverse as Canada, Finland, Greenland (Kingdom of Denmark), Iceland, Norway, Russia, Sweden, and the United States.

Although ISO 37120 presents itself as the international standard for measuring urban sustainability in all cities on the planet, we do not see it as the final word in measurement, but rather a useful tool to help uncover issues and start discussions. We did not attempt a complete application here because the ISO contains 128 indicators, and there are approximately fifty Arctic cities with a population of more than twelve thousand people. Collecting the 6,400 data points (128 x 50) for a comprehensive comparison is a task for the future—one that we are currently trying to implement. In the meantime, however, it is possible to raise several general and specific questions about the standard.

What Is the Theory of Sustainability?

One general question that deserves attention is whether there is a theory of sustainability in ISO 37120. Certainly, the document laying out the standard does not differentiate causes from effects. It simply uses its definitions to measure the level of sustainability the cities have achieved.

Sustainability theory is at core an assertion that we need to pay attention to how current practices will affect living standards in the future and that economic, environmental, and social processes are intertwined in ways that cannot be separated. The hypothesis is that cities that approach decision making in a holistic manner will achieve better outcomes that make life better for future generations.

Why do some cities perform better than others in terms of sustainability? Because we have not fully implemented the ISO indicators for the Arctic cities in a comprehensive manner, we are not in a position to state authoritatively how the cities compare to each other. While we have measured some aspects of sustainability across a few of the cities, these analyses provide only a partial picture of the overall sustainability story.

In order to answer the question of why some cities perform better than others, we will need answers to an additional question: Do one or more of the items measured drive sustainability or is it the combination of all the elements taken as a whole that is important? Depending on your background, you might argue that the real driver is governance, or the effort to reduce greenhouse gas emissions, or some other factor. A political scientist, for example, might say

that sustainability is the result of effective political leadership from above or active citizen participation from below, or, more likely, some combination of these two elements and their interactive effects. Research has shown that such interaction is crucial in numerous areas of human development, including democratization (Lussier 2016), police reform (Marat 2018), and urban design (Ryan 2017; Sanoff 2000: 7). Engineers might be more inclined to look at ways to reduce greenhouse gas emissions, and argue that such efforts are central to sustainability regardless of the way that society is organized politically. Others will focus on elements of culture or a whole range of other potential drivers.

Of course, as Jim Powell's chapter on Whitehorse makes clear, sustainability planning is largely meaningless if cities do not take steps to implement their plans. Many sustainability plans exist only on paper and are not implemented, as Alexander Sergunin noted in his survey of Russian cities. The ISO has no measure of implementation for sustainability planning, which gives the measurements included in the index a rather static feel. Much more attention needs to be paid to turning the dry statistics of the ISO index into something that would inspire the citizens of various cities to take action in ways that boosts the city's performance on these indicators.

After we have collected more data and analyzed the patterns among them, it will likely be possible to provide more of an answer to these questions. Perhaps it will be possible to point to a few key components of sustainability that are crucial, both in the conceptualization of sustainability and in its implementation in practice. Or it may turn out that everything matters, and for a city to make progress it must somehow find ways to integrate effective policies for improving everything from energy efficiency to wastewater management.

A Lack of Forward-Looking Dynamics

Marlene Laruelle's study of Norilsk shows that the ISO indicators can provide a good picture of the city's current state of affairs, but do not really capture the dynamics of the city as it moves from its past into its future. The indicators do not give a sense of what legacy each city carries with it. Nor do they take into account how the nineteen components of the standard need to interact with each other in order for a city to make progress. Existing sustainability plans often fail to take into account this integration, as Sergunin's survey of Russian cities showed.

By simply providing a snapshot of sustainability, the indicators do not explicitly measure what efforts the various actors are taking to improve the level of overall sustainability. Do the local officials and citizens make a conscious effort to push sustainability policy forward (Portney 2013)? Is there a dialogue among the various stakeholders to develop a coherent and representative sustainability plan? Such interactions are crucial for success in achieving sustainability, but the ISO does not really ask if they are taking place.

Who drives the process of enhancing sustainability forward? In the case of Norilsk, it is really international actors who are pressuring the city to improve its wretched pollution situation. Without this outside force, the corporate interests that dominate the city would be more likely to focus on making bigger profits than caring about the city's environment or the social fabric of the city. In Whitehorse, for example, it is incentives from the federal government that drive efforts to promote sustainability while measuring progress toward a defined set of sustainability goals. Innovative firms took the lead in developing renewable sources of energy in Nome. In Vorkuta, pressure for change may come from residents who are barely eking out a living and who are turning to all variety of methods to survive. Of course, in conditions of poverty, just getting by is the main goal rather than sustainability, but the difficulty of the conditions in which these individuals live forces them to find solutions that might help them improve their overall situation in ways that make the city more sustainable.

A Failure to Integrate across Topics

While the ISO 37120 seems to provide a comprehensive list of the components that make up urban sustainability, it does not really make an effort to explain how the various components are interconnected. The chapter examining energy and governance in Nome and Lavrentiya found that the ISO measures did a good job analyzing the energy situation in the two cities. It fell short, however, in the area of governance and particularly with regard to the linkages between governance and energy policy, one of the key factors needed to make a sustainable city. The main governance indicator in the ISO focuses on the number of women elected to public office at the city level. This indicator certainly measures a worthy goal, but it does not give us much purchase in explaining why one city is able to adopt more sustainable energy supplies than another. To do that we would need

to examine such things as the ability of the city government to offer incentives to the private sector to build renewable energy sources or even to develop those resources by the state. In other words, to truly understand the energy security of a city, it is necessary to measure its actual energy use and the source of its supplies alongside a fine-grained understanding of how the city governs its energy consumption.

Of course, it will always be difficult to measure the level of governance with quantitative indicators. Beyond doubt, it is true that there are vast differences in the governance of Arctic cities, including the differences between authoritarian Russia and the democratic West, or more fine-grained differences in electoral systems for urban legislatures, or whether the mayor is elected directly by his constituents or appointed by the city council. But knowing how the city government functions will provide useful insight into improving our understanding of what city governments can do to improve sustainability performance and what constrains them. Accordingly, it is necessary to continue studying what works in terms of governance at the city level and what does not.

Andrey Petrov's chapter on fate control makes an argument for measuring how well cities are represented in regional governments rather than looking at the nature of the city-level government. With the exception of Singapore, cities operate within the context of their larger countries and often do not have full control over the policies and conditions that shape their sustainability policies. Understanding how cities navigate these constraints is certainly an important component of understanding their governance.

Does the ISO Apply to Arctic Cities?

Another question raised by the international standard is whether it is possible to apply a set of metrics designed to measure all cities around the world to Arctic cities. Arctic cities differ from other cities in obvious ways—their extreme and rapidly changing climates, remote locations, thin economies often based on resource extraction, and strong emphasis on Indigenous culture. Arctic cities differ from their southern counterparts in that some of them are built on permafrost: As this permafrost thaws, these cities will have to take action to protect buildings, roads, pipelines, and other infrastructure. The silence on permafrost is one way that that the current edition of the ISO lacks a region-specific understanding of Arctic conditions.

Many of the metrics in the ISO seem to work as well in Arctic conditions as they do in other parts of the globe. As Carrie Schaffner's chapter makes clear, Arctic cities play many of the same roles as other cities farther south. By collecting ISO data about all cities, we can get a sense of how Arctic cities compare to them and better understand the extent of the challenges people face living in the North.

In the following we examine areas where the ISO metrics do not really give us a good sense of life in the Arctic. The chapters in the book propose solutions to these issues.

Transportation to Isolated Cities

Arctic cities are frequently remote from the rest of human civilization and lack connectivity to the outside world. The combination of isolation and a dependency on outside supplies of food and other essential goods means that Arctic cities experience a kind of vulnerability that cities in more heavily populated areas of the world do not. While airports can typically function year-round, cities that rely on ice-roads or river transportation can find themselves cut off from supplies during some seasons.

In the case study of Vorkuta and Salekhard, we find that the transportation indicators included in ISO 37120 do not provide much insight to the problem of isolation that is often characteristic of Arctic cities. The ISO transportation indicators focus on the extent of public transportation within a city. Such metrics certainly make sense when examining how much local transportation a city provides to its residents, and that number helps determine to what extent a city is sustainable. However, the exclusive focus on those measurements requires the assumption that the cities themselves are linked to a well-developed transportation network. In the Arctic context that assumption does not hold across cities and instead should be an object of measurement. In this sense, the ISO is missing a way to measure the remoteness of a city, which is crucial to measuring urban sustainability in Arctic circumstances.

Aleksandra Durova's chapter examining cities in the Sakha Republic takes this analysis one step farther by inquiring whether regional policymakers take into account climate change as they are planning transportation systems in the republic. Because the climate is changing rapidly in northern latitudes, cities that depend on outside sources to supply themselves will find that they are facing a growing set of challenges in terms of potential connectivity gaps. It is necessary to take steps now to ensure that any problems that arise in the

future can be addressed through appropriate means. Gaining a better understanding of the planning process to address these problems is crucial to understanding whether policy responses will be adequate or, alternatively, perhaps will cause more problems. The ISO for urban sustainability does not really address any of these issues though it is clear that effective planning is crucial for ensuring future urban sustainability in Arctic conditions.

Economic Diversity

As with the transportation indicators, the ISO metrics do not consider the diversity of a city's economy in measuring its sustainability. Rather, the indicators focus on measures of unemployment; the assessed value of commercial and industrial properties; and the number of businesses, patents, and hotel-night stays. The ISO does track population demographics, including a profile measure for the number of pensioners.

Overall, a measure of economic diversity is crucial to identifying a city's reliance on one industry for its survival. This is a major problem in the Arctic overall, including in both Russia and the Western countries. One-industry towns are extremely vulnerable to gyrations in international commodity markets and therefore have little control over their own fate. While levels of employment give a general picture of a city's economic health, understanding the city's ability to survive over the long term requires a more comprehensive picture of economic diversity.

Culture

As Vera Kuklina and Natalia Shishigina's chapter on culture in Yakutsk makes clear, ISO 37120 includes indicators for culture and sports, which it lumps into one category. However, measuring the number of cultural institutions, such as theaters, movie houses, and libraries, is only a starting point for understanding the cultural vitality of a city. Kuklina and Shishigina argue that sustainability is based on an appreciation of the intimate relationships between humans and the local environment. These cultures can be quantified in some ways, but have to be considered in specific national, regional, and local contexts for comparisons across different cities and countries.

One factor that is clearly missing from the ISO urban sustainability indicators is a way to account for Indigenous cultures. Most cities around the world typically fail to acknowledge Indigenous

contributions, though the Indigenous communities are increasingly visible in a growing number of areas. Indigenous contributions have long been recognized in the Arctic context. As the culture chapter in this volume argues, there is a strong need to use extensive qualitative data to better understand the Indigenous cultures where education, language preservation, subsistence activities, and environmental problems are closely interrelated. While these relationships have evolved within Indigenous cultures, in the urban setting they have been mediated by infrastructural development, as Kuklina and Shishigina point out. Since ISO 37120 is silent on many of the concerns of the Indigenous community, it might best be seen as a companion to indexes that specifically seek to measure the quality of Indigenous life in Arctic conditions.

Attachment to Place

Several of the chapters mention the need to address the issue of attachment to place (Giuliani 2003; Low and Altman 1992). Residents of depressed and polluted cities often want to continue living there despite the objectively poor conditions that surround them. They feel strong emotional bonds to the areas where they are located and refuse to leave, even when offered financial incentives to do so. Such attachments seem to explain why people are willing to live in places like Vorkuta or Norilsk.

However, measuring such ties is particularly difficult using quantitative rubrics. The attachments are largely emotional and it is difficult to find ways to quantify them. It might also be hard to explain why people feel pride of place in areas where past accomplishments were coerced through forced labor that resulted in extensive human suffering. We cannot replicate such passions by formula.

Given the nature of these emotional ties, the index can only be one of many tools used to measure urban sustainability in the Arctic. It must be combined with other techniques, including purely qualitative ones. Hopefully, the case studies of cities included here provide some insights into the nature of these emotional attachments that help to drive sustainability policies forward.

Extensions to the Existing International Standard

Given these criticisms of ISO 37120 in general and in its specific application to Arctic cities, does it make sense to propose extensions

to it? While some might assert that the current standard has a certain elegance and parsimony, it is possible that it should be expanded in some ways to take into account factors that are missing now and could help it provide a more complete portrait of urban sustainability.

Forward-Looking Urban Planning

In the area of urban planning, the core indicator in the ISO is the amount of green space in a city. Supporting indicators examine the amount of land devoted to informal settlements, the jobs–housing ratio, and proximity to basic services. Profile indicators include the number of trees, population density, and built-up density. All of these indicators are important for understanding urban life, but they do not really tell us much about how a city can take actions to ensure that it will remain sustainable for generations to come.

Alexander Sergunin's chapter that discusses several Russian cities provides a brief primer on urban planning and examines how well several Russian Arctic cities apply these principles. Most importantly, it is necessary to measure to what extent cities engage in planning, how much they incorporate community input into this planning, and what kind of personnel and financial resources they devote to actually implementing the plans they develop. Jim Powell's chapter celebrating Whitehorse's successes in these areas gives us a sense of what a successful model of implementation might look like. Understanding these processes would truly increase our ability to forecast how well Arctic cities will be able to anticipate and prepare for hazards they might face in the future. A visit to Whitehorse in the summer of 2019 revealed that the city's planning team was not happy with the results of their work so far and was actively seeking ways to improve the implementation process. To ensure continued success, even cities that seem to do well in their sustainability performance need to keep finding ways to enhance their performance.

Fate Control Index

Andrey Petrov's chapter similarly focuses our attention on the issue of the extent to which communities and individuals control their own destinies. His examination of fate control in Arctic cities demonstrates that generally cities in northern Scandinavia perform the best, while urban settlements in the Russian Arctic lack many of the most important elements of fate control, with Canadian and US cities positioned somewhere in between. Being able to control one's fate is crucial to

ensuring the sustainability of one's community. Petrov's chapter proposes a number of ways to measure this issue; his chapter includes some of the indicators from the ISO, though organized differently. In this sense, the Fate Control Index is a useful supplement to the ISO, but is not comprehensive enough to replace it.

The Role of Corporations

Stephanie Hitztaler and Veli-Pekka Tynkknen's chapter examining the role of corporate social responsibility in pushing forward sustainability issues draws our attention to the role of various actors beyond the state and citizens in the governing process. Corporations have extensive resources and can advance the sustainability agenda through programs designed to help cities if given the right incentives. Hitztaler and Tynkknen's analysis of Gazprom Neft and its actions in the Yamal Peninsula is quite critical of the company's overall behavior, so this particular corporation cannot be considered a model. Even though the company has built sports and arts facilities, the corporation's total sustainability impact on the area where it operated was negative. But finding ways to effectively measure corporate social responsibility so that it effectively pushes cities toward more-sustainable actions would be a real contribution to the ISO and help it find ways to mobilize resources in achieving greater urban sustainability.

Future Research

This analysis has shown that ISO 37120 is not a perfect measure of urban sustainability and that it lacks some features that would help it better measure conditions in the Arctic. Nevertheless, the general finding of the case studies was that it is a useful general measure of urban sustainability, particularly as a way to identify key issues that need discussion and as a way of stimulating further research.

The real promise in the standard, however, is in collecting the full set of data for all Arctic cities. Doing that would make it possible to better understand the interconnected issues that affect urban sustainability in a holistic manner. Having all the numbers would make it possible to see how the different variables—education, economics, governance, health, transportation, solid waste, and water among them—influence each other and affect the overall level of sustainability in the city. While collecting such a large dataset will require years of effort by numerous researchers, it will greatly improve our understanding of

urban sustainability in all of its complexity. Hopefully, the chapters in this book have helped us move closer to this goal by providing a valuable set of case studies that demonstrate how the ISO indicators can be used, both on their own, and more fruitfully as part of a multi-method approach that allows us to go deep into understanding how urban sustainability works and what is necessary to drive it forward. The PIRE team is actively collecting a full dataset and we hope to report those results soon.

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