

2. Green Infrastructure

This chapter introduces Green Infrastructure (GI) and its benefits. It then describes local GI elements —“hubs” and “links” —and lists the objectives and features which residents desire to see maintained, even as growth occurs in the area.

What is GI?

GI is a form of land use planning that seeks to retain natural system benefits to human populations, even as development occurs. It is similar to planning community utilities or a road network, except that its “infrastructure” consists of strategic, connective “links” and “hubs” where vegetation is preserved.

GI planning tools include mapping followed by voluntary acquisition strategies to retain vegetation. GI investments have been shown in many communities to be more cost effective than designing and building solutions for disrupted natural processes. For example, preserving wetlands can serve as an alternative to expensive flood control systems, and retaining and enhancing natural drainage ways is pennies to the dollar less expensive than investing in underground stormwater pipe networks.

GI Benefits to Communities

Green infrastructure networks provide multiple benefits to human communities by retaining life-sustaining natural system functions, including:

Water cycling through wetlands, streams, and groundwater infiltration provides values such as:

- Water quality
- Water supply
- Flood control
- Habitat for sustainable yields of fish
- Recreation and scenic values

Intact native vegetation and soils provide:

- Water purification
- Oxygen production and air cleaning
- Windbreaks
- Slope stabilization and reduced erosion, landslides, sedimentation and dust
- Sustainable yield opportunities: forest products, timber as a renewable energy source, hunting and wild food gathering.
- Scenic values, screening, buffering and privacy
- Wildlife habitat

“Our community is quiet, beautiful, and has clean air and water—you can still drink the surface water.”

Resident survey response to “Why you live here”



Residents are fortunate to be surrounded by intact GI.

Preservation of agricultural and managed natural landscapes helps provide:

- Local food security
- Sustainable yield opportunities
- Local jobs and economic benefits
- Preservation of scenic and cultural values

Green Infrastructure Elements

The term “hub” is a primary component of green infrastructure terminology and planning. A hub:

“Anchors green infrastructure networks and provides an origin or destination for wildlife and ecological processes moving to or through it.”

Hubs are usually a minimum size of 25 acres, but are ideally 250 or more acres.³ They include reserves, managed natural landscapes, working lands, regional parks and preserves, community parks, and natural areas. Significant hubs, sizable enough to support major wildlife populations and natural systems functions, are called “super hubs.”

Another basic GI element are “links.” Loosely defined, links ensure a linear, connective path or corridor that allows water and species to move from one hub to the next. Habitat links are essential for migrating animals, seed dispersal, water drainage and subsurface groundwater recharge.

For GI links a width of at least 115 feet is acceptable, although 1100’ links provide high quality buffering and movement values.⁴ Corridors can consist of a

creek, stream, wildlife or recreational trail, vegetative corridor, linear park, or working hedgerow.

Links and hubs span large areas and defy human-made boundaries. As such, to be successful, GI planning requires close coordination with adjacent communities and a regional approach to be successful.

GI Planning Process

In 2010, area residents met a number of times to look at map overlays of natural systems and land information for their community. These natural systems displayed some overlap into adjacent areas where connectivity is an issue (e.g., trails, streams, wetlands). Throughout this process, Borough planning and GIS mapping staff provided valuable support in helping the community understand and apply GI concepts. Initial findings are highlighted in this chapter, recognizing that GI research, planning, and mapping for the area remains an ongoing effort.

Existing Links and Hubs in the Community

As our neighborhoods grow, GI planning needs to be considered as they link together. MCS community is very fortunate that the MVMR and dispersed private land development patterns have maintained high quality links and hubs, which are described below and also highlighted in the map on page 10.

Super Hubs

Matanuska Valley Moose Range Super Hub

Primary Objectives: Protect wildlife habitat, existing open space and trails, and water and air quality.

Features: This State Legislatively Designated Area supports approximately 134 species of birds, 14 species of fish, and 28 species of mammals—and supports a healthy Moose Population. It is a flyway corridor for migrating Sandhill Cranes and raptors, a ground corridor for moose, and a waterway corridor for several species of anadromous salmon, important to for sport fishing and subsistence. It also serves as the headwaters for multiple creeks, significant wetland and hydric soils complexes, seven lakes, and four mapped public fishing/public access waterbody access points. The area also supports at least 21 public trails, and supports recreational and scenic values which are utilized both by Alaskans in nearby population centers and tourists, including guided hunts and trail rides.

Matanuska River Super Hub

Primary Objectives: Protect fish habitat, conserve erosion-prone lands, and maintain recreational opportunities.



MVMR is a flyway corridor for migrating sand hill cranes, raptors, and other birds protected under the Migratory Bird Treaty Act of 1918. In total, 836 bird species are protected by the treaty.

Features: This major river system provides a 100 year flood zone, wetland complexes, and clear water channels and tributaries supporting anadromous fish (salmon, trout, char, whitefish, sturgeon, etc.). The river bars and water are used for extensive recreation.

Hubs

Moose Meadows Wetlands Hub

Primary Objectives: Protect wetlands and riparian areas in the Moose Range, maintain clean drinking water for downstream residents, support habitat, and maintain recreational opportunities.

Features: Major wetland and hydric soil complexes, multiple anadromous fish spawning streams, and traditional, multi-use trails.

Castle Mountain Fault Bench Hub

Primary Objectives: Conserve sloped, erosion prone alpine areas, and recreational and scenic views.

Features: Talkeetna Mountains, alpine habitat, spectacular views into the Mat-Valley and Cook Inlet.

Premier Creek Hub

Primary Objectives: Protect riparian areas and habitat.

Features: Talkeetna Mountains, hunting, wildlife viewing, hiking, and scenic view opportunities.

Carnegie Creek - Soapstone Wetlands Hub

Primary Objectives: Protect wetlands for flood protection and drinking water values, and habitat.

Features: Extensive wetland complex.

North Palmer Farmlands Hub

Primary Objectives: Protect farmland and agricultural soils.

Features: Over 80 acres of actively farmed land.

Links

Moose Creek Link

Primary Objectives: Protect riparian habitat and anadromous fish populations currently in recovery. Serves as a link between two superhubs. Connects the MVMR Superhub with the Matanuska River Superhub.

Features: Anadromous fish habitat, canoeing, recreational hiking, trail crossings.

Upper Wasilla Creek

Primary Objectives: Protect wetlands, riparian areas, water quality, and fish habitat. Serves as a link between the MVMR Superhub, Wasilla Creek corridor, the Palmer Flats Superhub, and Cook Inlet.

Features: Headwaters, wetlands, anadromous fish.

Wasilla Creek Link

Primary Objectives: Protect wetlands, riparian areas, water quality, and fish habitat. Links the MVMR, and the Upper Wasilla Creek source waters to the Palmer Hay Flats Superhub and Cook Inlet.

Features: Headwaters, wetlands, anadromous fish.

Trails Links

Primary Objectives: Maintain recreational opportunities suitable to underlying soil conditions.

Features: Bear Ridge Trail, Skyline Trail, Wasilla Creek Headwaters Trail, Baxter Mine Trail, Wishbone Strip Mine Trail, Premier Mine Trail, Elks Lake Trail, Moose Creek Branch RR Trail, Matanuska Branch RR Trail.

Desired Future Conditions

The MCS Community desires to have its GI links and hubs preserved as a functional network, into the future, through a regional and state collaboration using voluntary protection measures with private landowners and with leveraged community investment.

Residents desire long-term protection and conservation of the natural resources that support the well-being of residents and the region's tourism and recreation economy. Residents also desire that GI principles and an understanding of true-cost economics be applied to all development projects with potential off-site impacts.

Thus, GI planning and goals are presented at the beginning of this document in order to serve as a basic framework for the plan's economic development, land use, transportation, trails, and community facilities chapters.

Moose Creek Salmon Stream Restoration

For centuries Moose Creek was a flourishing salmon stream. Fed from glaciers and springs within the Talkeetna Mountains, Moose Creek was filled with an abundance of salmon including Sockeye, Coho, Chinook, pink, and chum salmon.

However, more than 80 years ago this essential fish habitat was drastically changed. In 1916, the first load of coal was transported from Moose Creek, and in 1923, a railroad spur was constructed up the Creek for the expanding coal industry. From the 1920s to the 1980s there were nearly continuous physical changes made to Moose Creek by coal miners and the railroad, including the pushing of coal mine tailings into the creek and over time, these changes created several waterfalls. By the 1970s, the largest of these falls was completely impassable to spawning salmon, and the other downstream falls were challenging barriers that only the strongest adult salmon could overcome. Originally the creek was a winding stream, but after mining industry impacts, the creek was straighter and steeper, causing greater water velocities and significantly reducing the quantity and quality of fish habitat on Moose Creek.

In 2002, a Chickaloon Tribal elder brought this historical information to the attention of the Chickaloon Village Environmental Stewardship Department. In 2003, the Chickaloon Village Traditional Council, in collaboration with the US Fish and Wildlife Service, other agencies, and the local community, began a successful fish passage and habitat restoration of Moose Creek. On-the-ground stream restoration activities occurred in 2005 and 2006.



In 2007, Moose Creek was named a national "Top Ten Waters to Watch" for the restoration work initiated by the Chickaloon Village to reintroduce salmon to the upper reaches of the creek.

Green Infrastructure - Goals, Objectives and Actions

Goal 1. Maintain an intact, balanced, and healthy ecosystem.

Objective 1 - Protect and conserve the natural resources that support the well-being of residents and the region's tourism and recreation economy.	
ACTIONS (MCS community implementation)	RECOMMENDATIONS (encourage partners to implement)
<ol style="list-style-type: none"> 1. Continue the green infrastructure planning process, using available resources (Borough Planners, agencies, non-profit organizations, etc.) and working with other community councils in the region. 2. Work closely with federal, state, and local agencies to ensure that protection for the community's green infrastructure hubs and links are incorporated into other agency planning and development efforts. 	<ol style="list-style-type: none"> A. Work with Alaska State legislators and agencies to advocate for formal preservation of GI functions, hubs and links on public lands (MVMR) in the area. B. Request education and support from the Borough and other entities in planning for formal protection of area-wide farmland, trails, salmon streams, moose and migrating bird habitat, etc.

Goal 2. Preserve habitat connectivity, natural features, and GI functions in the community.

Objective 1 - Retain connected natural open space, migration corridors, and habitats on public lands when conducting resource development so as to preserve them for future generations.	
ACTIONS (MCS community implementation)	RECOMMENDATIONS (encourage partners to implement)
<ol style="list-style-type: none"> 1. Work with various governmental agencies, including The Alaska Department of Fish and Game, Habitat Division, the Alaska Department of Natural Resources, and the Alaska Division of Forestry, in order to further identify habitat corridors and implement appropriate planning and protections. 2. Work with trail advocacy groups to educate trail builders and recreationalists about migratory pathways to help minimize habitat corridor impacts. 	<ol style="list-style-type: none"> A. Request that ADF&G and/or other partners install kiosks at area trailheads to educate trail users about sensitive habitat corridors, including limiting impacts to spawning fish, bird nests, and moose calves in the MVMR. B. Ask the ADF&G, Habitat Division, to offer a series of presentations on the subject of migratory pathways in the MVMR, so that community council members and residents can become more knowledgeable.
Objective 2 - Preserve natural lands, features, and scenic qualities when planning new roads and subdivisions.	
ACTIONS (MCS community implementation)	RECOMMENDATIONS (encourage partners to implement)
<ol style="list-style-type: none"> 1. Support property owners in retaining natural lands as migratory pathways for wildlife and in preserving the scenic and natural qualities of the community when developing. 2. Educate residents about the dangers inherent in encouraging invasive non-native plant growth. 	<ol style="list-style-type: none"> A. Request that the Borough, subdivision, and roadway planners incorporate GI elements and take the community's natural environment into account during platting and development. B. Formally request vacation of rights-of-ways, such as Soapstone's Evergreen Street, as conservation corridors for wildlife and human foot traffic.

Goal 3. Protect water quality and soils.

Objective 1 - Develop and grow in a way that protects natural functions while respecting the needs and desires of landowners and other stakeholders.	
ACTIONS (MCS community implementation)	RECOMMENDATIONS (encourage partners to implement)
<ol style="list-style-type: none"> 1. Educate homeowners on the importance of protecting homesite water quality, and obtaining water rights to ensure viable wells. 2. Continue to encourage community members and partner organizations to seek grants for water and soil protection projects (e.g., stream crossing bridges). 	<ol style="list-style-type: none"> A. Enlist borough support in educating homeowners about properly constructed and maintained septic systems and disposal of hazardous waste materials. B. Work with Borough and State regulatory agencies to understand and be able to provide input on waste water discharge permits associated with resource extraction. C. Encourage the preservation or planting of vegetation along slopes, embankments, and road cuts so that the subsequent matted root system can catch and filter water.

Goal 4. Protect area streams and wetlands.

Objective 1 - Retain and enhance fish and wildlife habitat by preventing erosion and pollution in the watershed.	
<i>ACTIONS (MCS community implementation)</i>	<i>RECOMMENDATIONS (encourage partners to implement)</i>
<ol style="list-style-type: none"> 1. Inform local residents about ways that they can more effectively support law enforcement officers in upholding regulations limiting motorized off-road vehicles in streambeds (e.g., video documentation). 2. Develop and distribute educational material to area residents on current regulations and best practices. 3. Seek volunteers in the community to help support streambank stabilization and clean up efforts to enhance fish and wildlife habitat in the area. 	<ol style="list-style-type: none"> A. Work with DNR and ADF&G to seasonally restrict or relocate human activities, such as trails, away from sensitive areas (e.g., fragile vegetative mats overlaying hydric soils, fish spawning, and critical habitat areas). B. Work with DNR, ADF&G, and other partners to eliminate the use of “monster trucks” on all community trails, and to repair current damage. C. Support ongoing efforts by other entities to enhance fish and wildlife habitat, and minimize damage from natural resource use, extraction, and development projects.
Objective 2 - Promote trail relocation and recreation practices that respect fragile soils, wetlands and water resources.	
<i>ACTIONS (MCS community implementation)</i>	<i>RECOMMENDATIONS (encourage partners to implement)</i>
<ol style="list-style-type: none"> 1. Continue resident-based GI planning, research, and education about the area’s sensitive and hydric soils, wetlands, and water resources, in support of advocating for more respectful recreational uses. 	<ol style="list-style-type: none"> A. Request that DNR and ADF&G protect water, soil, and habitat resources on State land during seasons when most damage occurs, and even close trails under specific conditions. B. Request resources and support from agencies and user groups to do planning for “sustainable trails” that help minimize resource damage to wetlands, along streams, and around hydric and sensitive soils.

Goal 5. Protect clean air quality.

Objective 1 - Make the maintenance of clean air a community-wide priority, to support the well-being of residents.	
<i>ACTIONS (MCS community implementation)</i>	<i>RECOMMENDATIONS (encourage partners to implement)</i>
<ol style="list-style-type: none"> 1. Encourage residents to replace inefficient wood and coal burning stoves. 2. Instruct residents using burn barrels about proper methods and materials that are unsafe to burn. 3. Promote retention of natural vegetation or vegetation restoration to prevent soil erosion and dust pollution. 	<ol style="list-style-type: none"> A. Work with the Borough to create regulations to protect local air quality and minimize dust/air pollution impacts to residents from all types of industry and resource extraction. B. Work with DEC/EPA to ensure that effective dust mitigation measures are employed at construction and mining sites.

Goal 6. Preserve soils and open space in support of local agriculture and food production.

Objective 1 - Preserve the environmental integrity and available land that can support agriculture.	
<i>ACTIONS (MCS community implementation)</i>	<i>RECOMMENDATIONS (encourage partners to implement)</i>
<ol style="list-style-type: none"> 1. Create opportunities for residents to learn more about food production, including organic methods, and composting to protect local soil and water. 	<ol style="list-style-type: none"> A. Work with Greatland Trust and others to support local and regional preservation of farmland. B. Encourage Matanuska-Susitna College and Alaska Pacific University administrators to include more small-scale agriculture classes in their course listings.

MCS Green Infrastructure Goals

Supporting plans and policies

MSB Wide Comprehensive Plan (2005)

Goal (T-1): Integrated surface transportation.

- **Policy T1-6:** Provide and encourage street and trail connectivity at a regional and local level. Require new developments to integrate street and trail connectivity as a component of their proposal.

Goal (T-2): Protect and enhance the Borough's natural resources including watersheds, groundwater supplies and air quality.

- **Policy T2-1:** Identify and implement techniques and incentives that improve air quality, reduce non-point water pollution, and improve fuel efficiency.
- **Policy T2-2:** Encourage transportation planning efforts that recognize and consider the Borough's diverse land use development patterns and encourage local community land use decision-making.

Goal (LU-4): Protect and enhance the Borough's natural resources including watersheds, groundwater supplies and air quality.

- **Policy LU4-1:** Identify, monitor, protect, and enhance the quantity and quality of the Borough's watersheds, groundwater aquifers, and clean air resources.
- **Policy LU4-2:** Population density standards should accommodate the natural system's ability to sustain varying density levels.

Goal (LU-6): New developments greater than five (5) units per acre should incorporate design standards that will protect and enhance the existing built and natural environment.

Goal (CQ-1): Protect natural systems and features from the potentially negative impacts of human activities, including, but not limited to, land development.

- **Policy CQ1-1:** Use a system-wide approach to effectively manage environmental resources. Coordinate land use planning and management of natural systems with affected state and local agencies as well as affected Community Council efforts.
- **Policy CQ1-2:** Manage activities affecting air, vegetation, water, and the land to maintain or improve environmental quality, to preserve fish and wildlife habitat, to prevent degradation or loss of natural features and functions, and to minimize risks to life and property.
- **Policy CQ1-4:** Provide site restoration if land surface modification violates adopted policy or development does not ensue within a reasonable period of time.

- **Policy CQ1-5:** Make information concerning natural systems and associated regulations available to property owners, prospective property owners, developers, and the general public.

Goal (CQ-2): Manage the natural and built environments to achieve minimal loss of the functions and values of all drainage basins; and, where possible, enhance and restore functions, values, and features. Retain lakes, ponds, wetlands, streams, and rivers and their corridors substantially in their natural condition.

- **Policy CQ2-1:** Using a watershed-based approach, apply best available science in formulating regulations, incentives, and programs to maintain and, to the degree possible, improve the quality of the Borough's water resources.
- **Policy CQ2-2:** Comprehensively manage activities that may adversely impact surface and ground water quality or quantity.
- **Policy CQ2-3:** When appropriate, utilize Borough adopted "Best Management Practices" when managing watershed impacts.
- **Policy CQ2-4:** Develop a "wetland banking" and "land trust" program to provide property owners and developers alternatives when considering development strategies on environmentally sensitive lands.

Goal (PO-2): Protect and preserve natural resource areas.

- **Policy PO2-1:** Work cooperatively with numerous resource management agencies, community councils, and citizens to care for lakes, wetlands, streams, rivers, and wildlife habitat and corridors while providing public access for recreational opportunities that have minimal impacts to such areas.
- **Policy PO2-2:** Preserve opportunities for people to observe and enjoy wildlife and wildlife habitats.
- **Policy PO2-3:** Identify, through analysis, potential natural resource areas throughout the Borough that should be protected.

MSB Long Range Transportation Plan (2007)

Environmental Goal: Promote transportation projects and programs which reduce congestion, auto dependency, and air and water pollution.

MSB Recreational Trails Plan (2008)

Evolution of Trails Goal: Prevent recreational trails from being replaced by roads.