Fairbanks & North Pole Storm Water Management Program Guide

City of Fairbanks
City of North Pole

June 2019, 5th Edition

Preface

This guide provides an overview of the storm water management design and construction requirements for new development and redevelopment projects regulated by the City of Fairbanks and City of North Pole. It is part of a collaborative effort by the City of Fairbanks, City of North Pole, and Fairbanks North Star Borough to educate developers, engineers, contractors, and the general public about local storm water pollution control laws. Included in the guide is a brief overview of the local storm water management program, agency review requirements, general design considerations, and effective best management practices for the Fairbanks Urbanized Area. The Fairbanks North Star Borough has a separate, but similar, guide for their area of jurisdiction.

Summary of Changes from 3rd Edition to 4th Edition

Section	Change
p. 16	Updated contact information for FNSB
p. 28	Updated Attachment A: City of Fairbanks - Storm Water Fee Schedule

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Attachments

Acronyms & Abbreviations

ADEC ..... Alaska Department of Environmental Conservation

APDES..... Alaska Pollutant Discharge Elimination System

BMP..... Best Management Practice

DOT&PF ..... Alaska Department of Transportation & Public Facilities

ESCP..... Erosion & Sediment Control Plan

FNSB ..... Fairbanks North Star Borough

IDF ..... Intensity-Duration-Frequency

MS4 ..... Municipal Separate Storm Sewer System

NOI .....Notice of Intent

PSWCP..... Permanent Storm Water Control Plan

SWPPP .....Storm Water Pollution Prevention Plan

TMDL.....Total Maximum Daily Load

UAF .....University of Alaska Fairbanks

1. Storm Water Management Program Overview

Storm water runoff is generated when water from rain and melting snow flows over land instead of infiltrating into the ground. As runoff travels over developed land such as lawns, driveways, streets, parking lots, building rooftops, and other constructed improvements, it accumulates pollutants. Such pollutants can include sediment, oil and grease, solvents, detergents, heavy metals, litter/debris, pesticides, fertilizers, nutrients, and pathogens. Local storm water conveyance systems, known as Municipal Separate Storm Sewer Systems (MS4s), concentrate runoff into storm drain pipes, ditches, and other conduits. When this concentrated flow leaves the MS4, it empties into local water bodies carrying the pollutant load with it. The results can significantly alter our natural environment by contaminating drinking water supplies, making recreational areas unsafe and unpleasant, harming fish and wildlife populations, and impairing native vegetation.

Federal and State regulations based on the Clean Water Act require communities that reach certain population density levels to develop, implement, and enforce storm water management programs that will reduce the discharge of pollutants from the MS4 and protect water quality. These regulations are triggered when a community receives an urbanized area designation by the U.S. Census Bureau. By definition, an urbanized area is a land area comprised of an urban district and the adjacent densely settled surrounding area, known as the urban fringe, that together have a residential population of at least 50,000 people and an overall population density of at least 1,000 people per square mile. The U.S. Census Bureau determines urbanized areas based on census data and then maps the areas based on both visible physical boundaries such as city blocks, roads, or streams, and invisible administrative boundaries such as political corporate limits or subdivisions.

1.1 Fairbanks Urbanized Area

The U.S. Census Bureau designated the Fairbanks Urbanized Area in May 2002. After the 2010 Census, the Fairbanks Urbanized Area was expanded to include newly populated areas (see Figure 1). It includes portions of the City of Fairbanks, City of North Pole, and 51 Fairbanks North Star Borough (FNSB) Road Service Areas. An overview map of the urbanized area is included as Figure 1 on Page 8. To meet Federal and State storm water management mandates, the City of Fairbanks, City of North Pole, and FNSB each adopted ordinances to regulate the design and construction of new development and redevelopment activities within the urbanized area boundary. New development and redevelopment projects that are within city limits but outside of the urbanized area boundary are not locally regulated under the adopted ordinances. In addition, new development and redevelopment projects that are within the urbanized area boundary but outside city limits are only locally regulated under the adopted ordinances if the project impacts the MS4 within a FNSB Road Service Area. Table 1 on the following page provides references to

the applicable ordinances for locally regulated projects within the urbanized area. These ordinances should be reviewed prior to the design or construction of a regulated project.

Table 1. Ordinance References for Locally Regulated Projects in the Fairbanks Urbanized Area

Agency	Project Location	Ordinance Reference
City of Fairbanks	Within the urbanized area of the City of Fairbanks	City of Fairbanks 2017 Wastewater Treatment Regulations, Divisions 10 & 12, Ordinance No. 17-6038 • Division 10, Ordinance No. 17-6038 • Division 12, Ordinance No. 17-6038
City of North Pole	Within the urbanized area of the City of North Pole	North Pole Municipal Code, Title 15 • Chapter 15.66, Ordinance No. 08-14 • Chapter 15.74, Ordinance No. 09-10
FNSB	Within the urbanized area of a FNSB Road Service Area	FNSB Code, Title 21 • Ordinance No. 2008-22 • Ordinance No. 2009-27

1.2 Comprehensive MS4 Map

In addition to the adoption of the aforementioned ordinances, the City of Fairbanks, City of North Pole, and FNSB, working collectively with the Alaska Department of Transportation & Public Facilities (DOT&PF) and the University of Alaska Fairbanks (UAF), developed an area wide MS4 map. The map is GIS-based and shows the locations of the components of the MS4 including catch basins, manholes, storm drain pipe, ditches, culverts, and outfalls, as well as the locations of water bodies that will receive the storm water discharges from the outfalls. The FNSB GIS has developed a link to the map on the Fairbanks Urbanized Area Storm Water Management webpage at http://gis.co.fairbanks.ak.us/website/stormwater/viewer.htm. The map may be used by interested parties to identify the location of MS4 components near their project sites. Note however, all MS4 components shown on the map should be field verified prior to design.

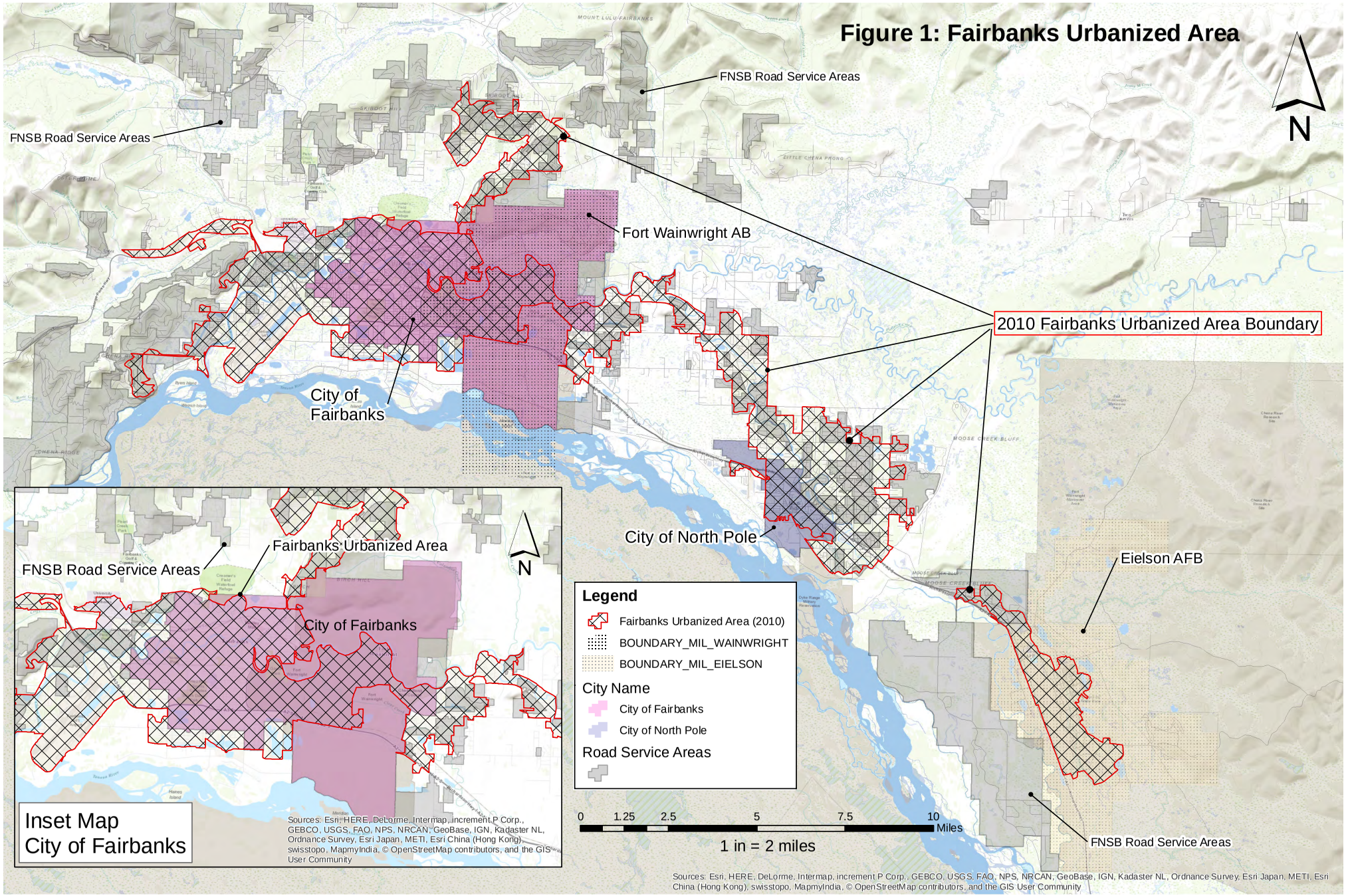
Figure 1: Fairbanks Urbanized Area
FNSB Road Service Areas
FNSB Road Service Areas
Fort Wainwright AB
2010 Fairbanks Urbanized Area Boundary
City of Fairbanks
City of North Pole
Eielson AFB
FNSB Road Service Areas
N
Legend
Fairbanks Urbanized Area (2010)
BOUNDARY_MIL_WAINWRIGHT
BOUNDARY_MIL_EIELSON
City Name
City of Fairbanks
City of North Pole
Road Service Areas
0 1.25 2.5 5 7.5 10 Miles
1 in = 2 miles
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Inset Map
City of Fairbanks
Fairbanks Urbanized Area
FNSB Road Service Areas
City of Fairbanks
N
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2. Agency Review Requirements

In accordance with the requirements of the aforementioned ordinances, use of both permanent and temporary best management practices (BMPs) are required by for new development and redevelopment projects to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters to the maximum extent practicable. The two types of BMPs are incorporated into different phases of the project, and require separate project submittals. Permanent BMPs are incorporated into the project design and expected to be maintained for the life of the new or redeveloped facility, while temporary BMPs are utilized only during the construction phase of the project. An example of a permanent BMP would be a grass swale designed and constructed along the down-slope edge of a parking lot to filter accumulated pollutants in runoff from the parking lot. An example of a temporary BMP would be silt fence installed along the perimeter of the construction site when soils are exposed, which would later be removed when the soils have been stabilized.

2.1 Project Submittals

The City of Fairbanks, City of North Pole, and FNSB have worked collaboratively to develop similar storm water management project submittal requirements for new development and redevelopment projects within the urbanized area. There are some distinctions, however, between the three agencies with regard to privately- versus publicly-funded projects and thresholds for the area of ground disturbance for submittals. For example, the City of Fairbanks and City of North Pole only accept submittals for privately-funded projects. Publicly-funded projects are not subject to review by either entity, but remain under the purview of the Alaska Department of Environmental Conservation (ADEC). Conversely, the FNSB accepts submittals for both privately- and publicly-funded projects. In addition, the City of Fairbanks requires a submittal for activities that result in a ground disturbance of 10,000 square feet to one acre on a common parcel, whereas the City of North Pole and FNSB do not. Below is a brief description of the key storm water management project submittals applicable to the urbanized area, as well as an agency submittal matrix, followed by the specific agency submittal requirements.

Permanent Storm Water Control Plan (PSWCP) – A document that describes the specific BMPs, and maintenance therein, to be incorporated into the project design to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters to the maximum extent practicable for construction activity that will result in a ground disturbance of greater than or equal to one acre on a common parcel.

Erosion & Sediment Control Plan (ESCP) – A document that describes the specific measures and sequencing to be used to control erosion and sediment on a development site during construction for activity that will result in a ground disturbance of 10,000 square feet to one acre on a common parcel.

Storm Water Pollution Prevention Plan (SWPPP) – A document that describes the BMPs and activities to be implemented during construction by a person or business to identify sources of pollution or contamination at a site, and the actions to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters to the maximum extent practicable for construction activity that will result in a ground disturbance of greater than or equal to one acre on a common parcel.

Notice of Intent (NOI) – The ADEC's form for notifying State authorities of the intent to discharge storm water from construction sites and applying for coverage under the Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit.

Table 2. Fairbanks Urbanized Area Storm Water Management Project Submittal Matrix

Agency	Submittal	10,000 square feet to 1 acre, privately funded	1 or more acres, privately funded	1 or more acres, publicly funded
City of Fairbanks	PSWCP		✓	
	ESCP	✓		
	SWPPP		✓	
	NOI		✓	✓
City of North Pole	PSWCP		✓	
	ESCP			
	SWPPP		✓	
	NOI		✓	✓
FNSB	PSWCP		✓	✓
	ESCP			
	SWPPP		✓	✓
	NOI		✓	✓
ADEC	PSWCP[1]			
	ESCP			
	SWPPP			
	NOI		✓	✓

[1] The ADEC requires submittal of a PSWCP for all publicly-funded projects, regardless of size. See 18 AAC 72.600 for more information.

2.1.1 Permanent Storm Water Control Plans

For new development and redevelopment projects within the urbanized area of Fairbanks or North Pole that will result in a ground disturbance of greater than or equal to one acre funded by the private sector, including private development where all or part of the project will be transferred to the City of Fairbanks or City of North Pole at a later date (i.e. roads and associated

right-of-way within new subdivisions), submit a PSWCP developed by a professional in erosion and sediment control or a professional engineer registered in the State of Alaska. Each PSWCP shall contain the following items:

a. BMP Selection Narrative
    i. *Site Description:* Provide a description of the property boundary, construction site boundary (area of disturbance), existing soil conditions, and approximate depth to groundwater.
    ii. *Site Conditions:* Include a summary of pre- and post-developed site conditions including existing and proposed land use, amount of impervious area, drainage patterns to and from the site, and any known historical drainage problems such as flooding and/or erosion.
    iii. *Receiving Waters:* Include the name and approximate distance (to the nearest 100 feet) of all receiving waters, including wetlands as defined by the U.S. Army Corps of Engineers, where storm water will discharge. If the storm water discharges to the MS4 (i.e. roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), identify the point of discharge to the MS4 and the receiving water to which the MS4 outfalls.
    iv. *Pollutant Sources:* Include a description of all potential pollutant sources from the proposed land use, which may add pollutants to storm water discharges.
    v. *BMP Selection:* Identify all permanent structural and non-structural BMPs selected and incorporated into the project design to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters to the maximum extent practicable. For each BMP, also include a description of the methodology used to size and locate each BMP.
    vi. *Operation & Maintenance Procedures:* Include a description of all operation and maintenance procedures for each BMP to be installed on site.
b. Site Plan
    i. *Site Characteristics:* Include the property boundary, construction site boundary, names of all adjacent streets or roadways, north arrow, and scale bar.
    ii. *Construction Plan:* Include the location of all planned excavation and fill activities, existing and proposed buildings, surfaced areas, and utility installations.
    iii. *Drainage Patterns:* Include approximate slopes (to the nearest percent) and direction of slopes (i.e. flow direction arrows) for both pre- and post-development for all surfaces, ditches, and culverts.
    iv. *Receiving Waters:* Identify all surface waters and wetlands within one mile of the construction site, including the location where storm water will discharge to the receiving waters. If the storm water discharges to the MS4, identify the point of discharge to the MS4.

v. *Permanent Storm Water Controls:* Identify the location of all permanent structural BMPs to be installed on site, as well as all areas where non-structural BMPs will be implemented.

c. Sizing & Design Information
   i. Include calculations, manufacturers' guidance, or other process decisions showing how all permanent structural BMPs were sized and designed, and their performance goals. At a minimum, the project must meet the design requirement for (1) runoff volume that post-development peak runoff shall be limited to 5-percent over pre-development peak runoff based on the 10-year, 1-hour duration storm event; and (2) runoff quality that permanent BMPs shall be designed to treat the initial 0.5 inch of runoff from each storm event, and provide treatment at a minimum of 0.005 inch per minute after the first flush storm event.

d. A signed statement that the owner of the site will operate, maintain, and/or schedule all permanent BMP(s) in accordance with the PSWCP.

e. Payment of the PSWCP Plan Review Fee in the amount prescribed by the City of Fairbanks or City of North Pole.

2.1.2 Erosion & Sediment Control Plans

For construction activity within the urbanized area of Fairbanks that will result in a ground disturbance of 10,000 square feet to one acre funded by the private sector, including private development where all or part of the project will be transferred to the City of Fairbanks at a later date (i.e. roads and associated right-of-way within new subdivisions), submit an ESCP including the following items:

a. Site Description Narrative
   i. *Site Description:* Provide a description of the property boundary, construction site boundary (area of disturbance), existing soil conditions, approximate depth to groundwater, and local climatic data, including the annual rainfall amount.
   ii. *Project Description:* Provide a description of the nature and extent of the construction activity, including all ground disturbing activities, their sequence, and any work requiring dewatering.
   iii. *Area of Disturbance:* Provide estimates (to the nearest 500 square feet) of the total area of the property, and the total area that is expected to be disturbed.
   iv. *Receiving Waters:* Include the name and approximate distance (to the nearest 100 feet) of all receiving waters, including wetlands as defined by the U.S. Army Corps of Engineers, where to storm water will discharge. If the storm water discharges to the MS4 (i.e. roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), identify the point of discharge to the MS4 and the receiving water to which the MS4 outfalls.

v. *Erosion and Sediment Controls:* Describe all BMPs to be used during construction, both structural (i.e. perimeter control, matting, etc.) and non-structural (project phasing, sequencing, etc.), including all BMP inspection and maintenance requirements.

b. Site Plan
   i. *Site Characteristics:* Include the property boundary, construction site boundary, names of all adjacent streets or roadways, north arrow, and scale bar.
   ii. *Construction Plan:* Include the location of all planned excavation and fill activities; and all existing and proposed buildings, surfaced areas, utility installations, material or equipment staging areas, temporary soil stockpile areas, and borrow sites.
   iii. *Drainage Patterns:* Include approximate slopes (to the nearest percent) and direction of slopes (i.e. flow direction arrows) for both pre- and post-construction for all surfaces, ditches, and culverts.
   iv. *Receiving Waters:* Identify all surface waters and wetlands within one mile of the construction site, including the location where storm water will discharge to the receiving waters. If the storm water discharges to the MS4, identify the point of discharge to the MS4.
   v. *Erosion and Sediment Controls:* Identify the location of all BMPs to be used during construction, including final stabilization.
c. BMP Detail Sheets
   i. *BMP Standard Detail Sheets:* Include standard drawings of all structural BMPs to be used, including BMP-specific notes detailing installation and maintenance requirements.
d. The name(s) and address(es) of the owner or developer of the site, and of any consulting firm retained by the applicant together with the name of the applicant's principal contact at such firm.
e. A signed statement that any land clearing, construction, or development involving the movement of earth shall be in accordance with the ESCP.
f. Payment of the ESCP Plan Review Fee in the amount prescribed by the City of Fairbanks.

2.1.3 Storm Water Pollution Prevention Plans

For construction activity within the urbanized area of Fairbanks or North Pole that will result in a ground disturbance of greater than or equal to one acre (or result in a ground disturbance less than one acre but will be part of a larger common plan of development or sale that will collectively disturb more than one acre) on funded by the private sector, including private development where all or part of the project will be transferred to the City of Fairbanks or City of North Pole at a later date (i.e. roads and associated right-of-way within new subdivisions), submit a SWPPP developed by a professional in erosion and sediment control or a professional engineer

registered in the State of Alaska. Each SWPPP shall meet/include the following requirements/items:

a. Conformance to the most recently issued ADEC APDES Construction General Permit.
b. Conformance to the most recently issued DOT&PF Alaska SWPPP Guide.
c. Conformance to any additional standards adopted by the City of Fairbanks or City of North Pole necessary to ensure that construction site operators practice adequate erosion, sediment, and waste control.
d. Meet the design criteria that BMPs used during construction shall be designed to handle the two-year, six-hour duration storm event without failure of the BMPs and without any degradation to water quality of the receiving water.
e. A copy of the NOI submitted to the ADEC.
f. A signed statement that any land clearing, construction, or development involving the movement of earth shall be in accordance with the SWPPP.
g. The name(s) and address(es) of the owner or developer of the site, and of any consulting firm retained by the applicant together with the name of the applicant's principal contact at such firm.
h. Payment of the SWPPP Plan Review Fee in the amount prescribed by the City of Fairbanks or City of North Pole.
i. Payment of the Construction Site Inspection Fee in the amount prescribed by the City of Fairbanks or City of North Pole.

2.2 City of Fairbanks

A detailed map of the urbanized area of Fairbanks is included as Figure 2 on Page 17. The project submittals listed above are included as line items on the City of Fairbanks Building Department Residential and Commercial Building Permit Applications, and shall be submitted through the Building Department. The City of Fairbanks will review each PSWCP, ESCP, and SWPPP submittal to determine their conformance with the provisions of the ordinances. Within seven business days after receiving the project submittal(s), the City of Fairbanks will, in writing:

a. Issue a Letter of Non-objection to the PSWCP, ESCP, and/or SWPPP;
b. Issue a Letter of Non-objection to the PSWCP, ESCP, and/or SWPPP subject to such reasonable conditions as may be necessary to secure substantially the objectives of the ordinances, and issue the permit subject to these conditions; or
c. Disapprove the PSWCP, ESCP, and/or SWPPP, indicating the reason(s) and procedure for submitting a revised application and/or submission.

For construction activity that will result in a ground disturbance of greater than or equal to one acre, the City of Fairbanks will inspect each construction site at least once per year. A copy of the

latest plan review and inspection fee schedule is available through the Building Department. If you have any questions regarding project submittal requirements, please contact the following agency representative:

Andrew Ackerman, Environmental Manager
City of Fairbanks, Engineering Division
800 Cushman Street, Fairbanks, Alaska 99701
Phone (907) 459-6836 / Email aackerman@fairbanks.us

2.3 City of North Pole

A detailed map of the urbanized area of North Pole is included as Figure 3 on Page 18. Similar to the City of Fairbanks, the project submittals listed above are included as line items on the City of North Pole Building Department Residential and Commercial Building Permit Applications, and shall be submitted through the Building Department. The City of North Pole will review each PSWCP and SWPPP submittal to determine their conformance with the provisions of the ordinances. Within ten business days after receiving the project submittal(s), the City of North Pole will, in writing:

a. Issue a Letter of Non-objection to the PSWCP and/or SWPPP;
b. Issue a Letter of Non-objection to the PSWCP and/or SWPPP subject to such reasonable conditions as may be necessary to secure substantially the objectives of the ordinances, and issue the permit subject to these conditions; or
c. Disapprove the PSWCP and/or SWPPP, indicating the reason(s) and procedure for submitting a revised application and/or submission.

For construction activity that will result in a ground disturbance of greater than or equal to one acre, the City of North Pole will inspect each construction site at least once per year. A copy of the latest plan review and inspection fee schedule is available through the Building Department. If you have any questions regarding project submittal requirements, please contact the following agency representative:

Bill Butler, Director of City Services
City of North Pole
125 Snowman Lane, North Pole, Alaska 99705
Phone (907) 488-2281 / Email bill@northpolealaska.com

2.4 FNSB & ADEC

For FNSB project submittal requirements, download a copy of their Storm Water BMP Design Guide at http://co.fairbanks.ak.us/PWorks/StormWaterManagementProgram/BMP_Design_Guide_Final.pdf, or contact the following agency representative:

Chad Hosier, PE
FNSB, Department of Public Works
P.O. Box 71267, Fairbanks, Alaska 99707
Phone (907) 459-1321 / Email chosier@fnsb.us

For ADEC project submittal requirements, visit their Storm Water Program webpage at http://www.dec.state.ak.us/water/wnpspc/stormwater/index.htm, or contact the following agency representative:

James Rypkema, Storm Water Coordinator
Program Manager, Storm Water & Wetlands
Wastewater Discharge Authorization Program
ADEC Division of Water
555 Cordova Street, Anchorage, Alaska 99501
Phone (907) 269-7692 / Email james.rypkema@alaska.gov

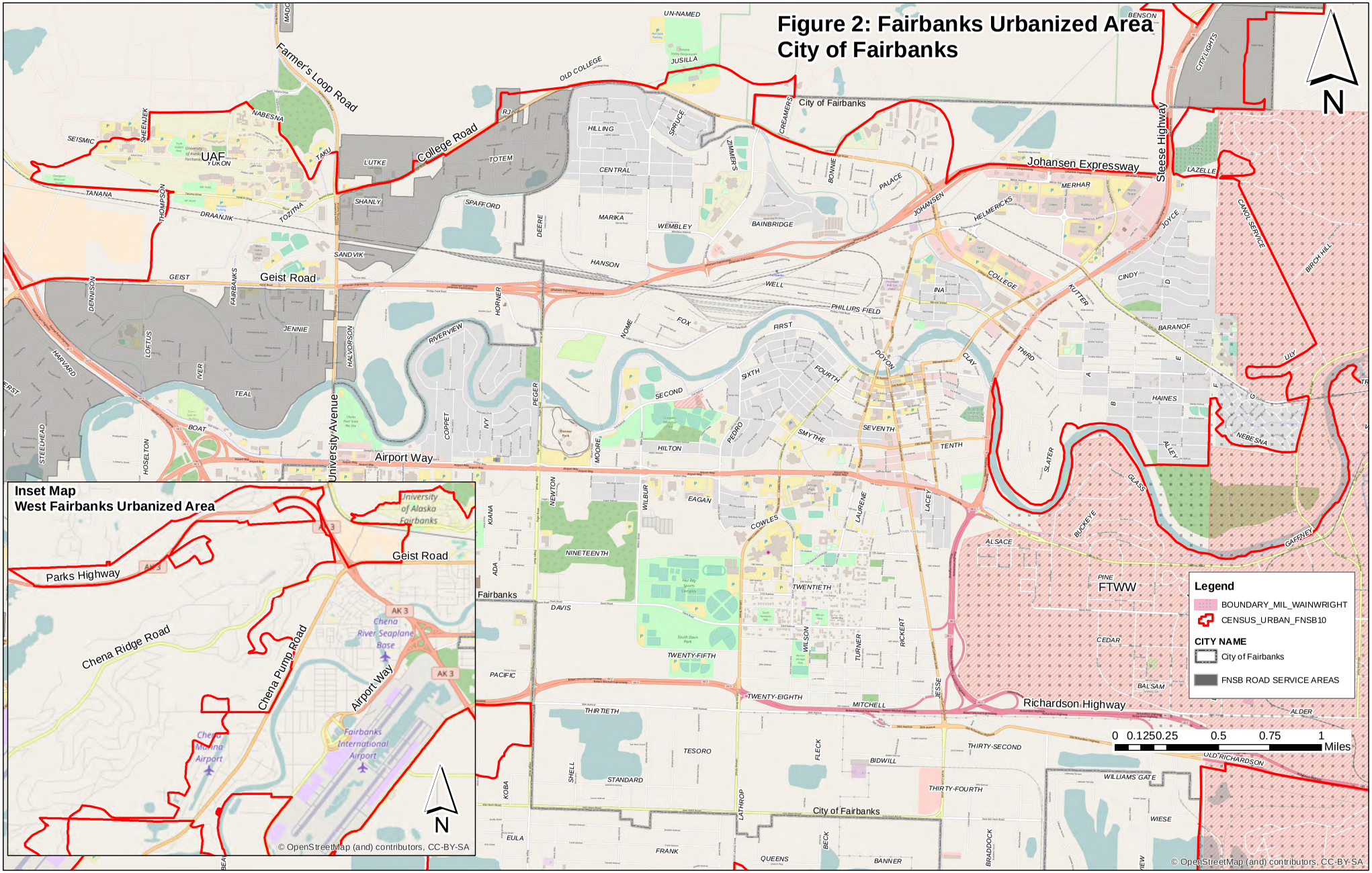
Figure 2: Fairbanks Urbanized Area
City of Fairbanks
Inset Map
West Fairbanks Urbanized Area
Legend
BOUNDARY_MIL_WAINWRIGHT
CENSUS_URBAN_FNSB10
CITY NAME
City of Fairbanks
FNSB ROAD SERVICE AREAS
0 0.125 0.25 0.5 0.75 1 Miles
N
Farmer's Loop Road
College Road
Geist Road
Johansen Expressway
Steese Highway
Airport Way
University Avenue
Richardson Highway
Parks Highway
Chena Ridge Road
Chena Pump Road
Fairbanks
City of Fairbanks
UAF
FTWW
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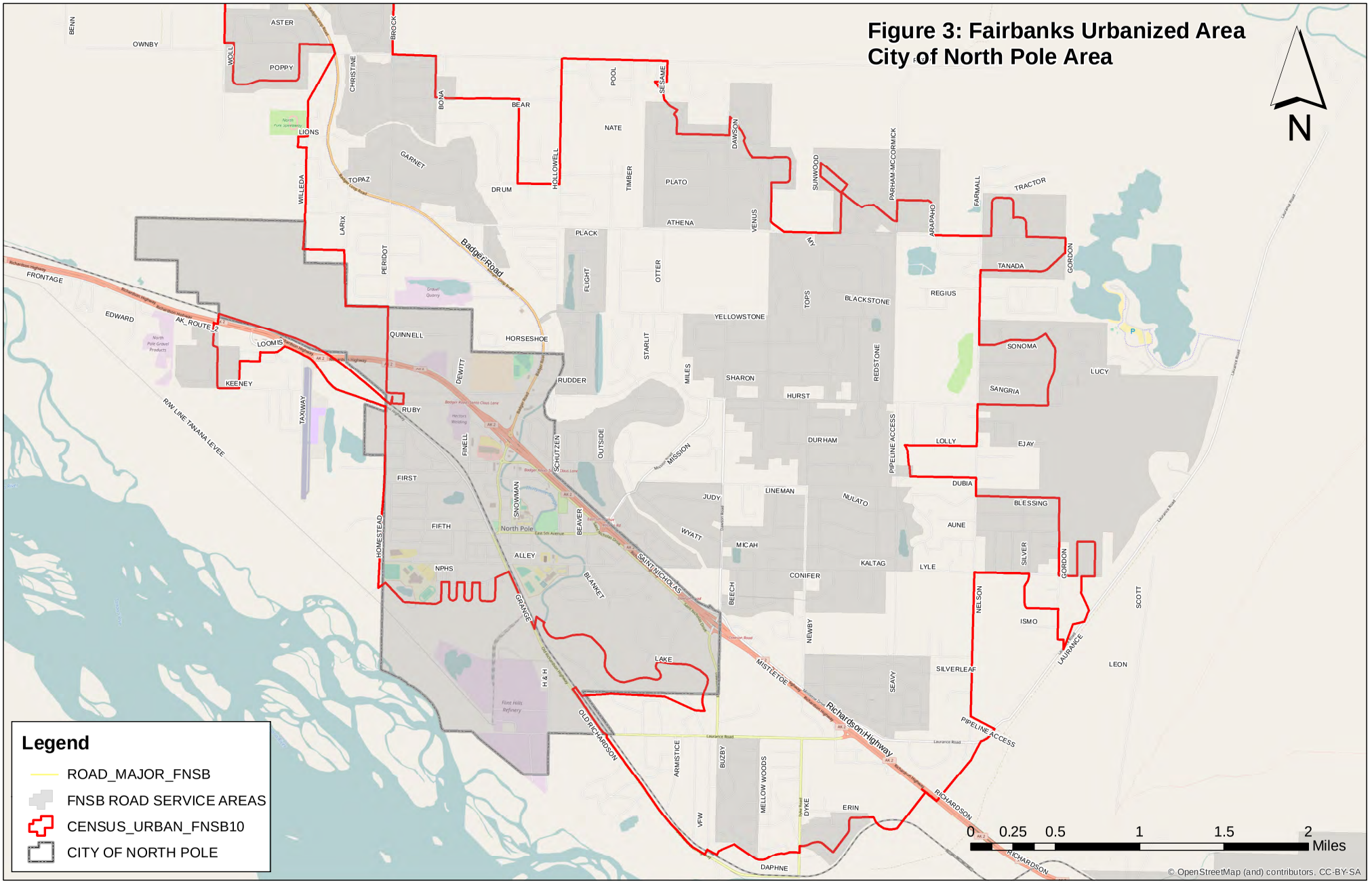
Figure 3: Fairbanks Urbanized Area
City of North Pole Area
N
Legend
ROAD_MAJOR_FNSB
FNSB ROAD SERVICE AREAS
CENSUS_URBAN_FNSB10
CITY OF NORTH POLE
0 0.25 0.5 1 1.5 2 Miles
© OpenStreetMap (and) contributors, CC-BY-SA
Badger Road
Richardson Highway
North Pole
Flint Hills Refinery
ASTER
POPPY
BEAR
NATE
PLATO
ATHENA
DRUM
GARNET
TOPAZ
LIONS
QUINNELL
HORSESHOE
RUDDER
RUBY
KEENEY
LOOMIS
EDWARD
FRONTAGE
AK_ROUTE 2
RW LINE TANANA LEVEE
TAXIWAY
FIRST
FIFTH
ALLEY
NPHS
HOMESTEAD
SNOWMAN
BEAVER
SCHUTZEN
OUTSIDE
FINELL
DEWITT
MISSION
JUDY
LINEMAN
NULATO
AUNE
MICAH
WYATT
KALTAG
LYLE
CONIFER
BEECH
NEWBY
SAINT NICHOLAS
BLANKET
GRANGE
LAKE
H & H
OLD RICHARDSON
MISTLETOE
SILVERLEAF
SEAVY
ARMISTICE
BUZBY
MELLOW WOODS
DYKE
ERIN
DAPHNE
VFW
PIPELINE ACCESS
RICHARDSON
LAURANCE
NELSON
ISMO
SCOTT
LEON
SILVER
GORDON
BLESSING
DUBIA
EJAY
LOLLY
DURHAM
HURST
SHARON
MILES
STARLIT
REDSTONE
YELLOWSTONE
BLACKSTONE
TOPS
REGIUS
TANADA
SONOMA
SANGRIA
LUCY
TRACTOR
FARMALL
ARAPAHO
PARHAM-MCCORMICK
SUNWOOD
DAWSON
VENUS
MY
OTTER
FLIGHT
PLACK
TIMBER
HOLLOWELL
POOL
SESAME
BONA
BROCK
CHRISTINE
WOLL
WILLEDA
LARIX
PERIDOT
OWNBY
BENN

3. General Design Considerations

Storm water BMPs must be designed and implemented based on the unique characteristics of the urbanized area. Geology, climate, precipitation intensities, and existing pollutant loads and distributions all factor into how much storm water can be expected and how the storm water can be managed.

3.1 Geology

The urbanized area lies on the northern edge of the Tanana River Valley in the interior of the state. The valley is bounded by the White Mountains to the north and the Alaska Range to the south with gently sloping alluvial fans between the hills and floodplains. The uplands in the immediate vicinity of the urbanized area are comprised of rounded ridges and hills consisting of weathered bedrock covered by varying depths of windblown silt. The lowlands are generally level floodplains and low benches consisting of sand and gravel deposits covered by varying depths of silts and peat. Meandering streams with sloughs and oxbow lakes are abundant. In general, vegetation is dominated by black spruce and sphagnum moss in the poorly drained lowlands and higher north facing slopes, and white spruce with paper birch and aspen in the better drained uplands and south facing slopes.

Discontinuous permafrost is present in the lowlands and on the higher north facing slopes. This permafrost is often found to be at or near 32 ºF and thus susceptible to melting when ground cover is disturbed by fire or human activity. The active layer varies from two feet or less in areas with undisturbed vegetated cover to in excess of 10 feet under roads or parking areas that are kept free of snow during winter. Groundwater levels are also prone to fluctuations with groundwater in the lowlands generally observed at depths between five and 20 feet below the ground surface. These levels are highly influenced by the Tanana and Chena Rivers and can vary from two to five feet throughout the year. Levels are highest in the late spring and early summer and drop throughout the late fall and winter with the lowest levels reached just before the spring melt.

3.2 Climate

The region has a continental subarctic climate with the warmest summers in the state, as well as the lowest record winter temperatures with extremes ranging from above 90 ºF to below -60 ºF. Mean annual temperatures average slightly below freezing, with a mean summer (June through August) temperature of approximately 59 ºF and a mean winter (November through March) temperature of approximately -1 ºF. Wintertime temperatures are strongly controlled by ground-based inversions, and as such may vary widely over short distances and in response to human modification of the local environment. The average annual precipitation is slightly above 10 inches with July and August on average the wettest months and April the driest. Snow covers the ground continuously from mid-October to late April with an average annual snowfall of approximately 68 inches and a mean monthly snow depth of approximately 14 inches.

3.3 Precipitation Data

Rainfall intensity-duration-frequency (IDF) curves for the Fairbanks area were developed as part of a storm water management study conducted by UAF in 2002. The IDF curves are presented in tabular form below for use in designing storm water BMPs in the urbanized area. Note that a second study conducted by UAF in 2003 contained possible calculation errors producing intensities for small duration storms much larger than field observations support. Use of the 2003 study is discouraged without further clarification from the study's authors.

Table 3. Selected Rainfall Intensity Data (inches per hour) for Fairbanks

Duration (hours)	Return Period (years)					
	1.5	2	5	10	25	50
0.083 (5 min)	0.91	1.00	1.38	1.90	2.74	2.98
0.167 (10 min)	0.70	0.77	1.06	1.46	2.11	2.29
0.25 (15 min)	0.59	0.65	0.89	1.23	1.78	1.93
0.50 (30 min)	0.41	0.45	0.62	0.86	1.23	1.34
1	0.26	0.28	0.40	0.52	0.72	0.81
2	0.17	0.19	0.26	0.32	0.43	0.52
3	0.13	0.15	0.20	0.24	0.32	0.41
6	0.09	0.10	0.13	0.15	0.19	0.26
12	0.06	0.06	0.08	0.09	0.11	0.17
18	0.04	0.05	0.06	0.07	0.09	0.13
24	0.04	0.04	0.05	0.06	0.07	0.11

3.4 Receiving Waters & Pollutants of Concern

The primary receiving waters within the urbanized area are the Chena River, Chena Slough, and Noyes Slough. Although any water body impacted by storm water from a new development or redevelopment project must be considered in the design and implementation of BMPs, these primary receiving waters are identified as impaired on the ADEC's 303(d) list and, therefore, require added attention. The State of Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report (https://dec.alaska.gov/water/wqsar/waterbody/integratedreport.htm)

identifies the pollutants of concern for the Chena River and Chena Slough as sediment from urban runoff, and for Noyes Slough as petroleum products, sediment, and debris from urban

runoff. To date, there are two Total Maximum Daily Load (TMDL) established for petroleum products and debris on Noyes Slough. The TMDL for both pollutants is set at zero. This TMDL document can be viewed from ADEC's TMDL webpage at www.dec.state.ak.us/water/tmdl/tmdl_index.htm.

Developers must ensure the project design and construction site controls adhere to all approved TMDLs, as well as identify other potential pollutants of concern for the design so appropriate BMPs are selected to address those pollutants. The type and amount of pollutants generated in storm water is often determined by the type of land use. Some examples of pollutants of concern for various land uses in the urbanized area are provided in Table 4 below.

Table 4. Pollutants of Concern for Various Land Uses

CATEGORY	Sediment	Oil & Grease	Solvents & Detergents	Heavy Metals	Litter/ Debris	Pesticides & Fertilizers	Nutrients	Pathogens
Residential Development	X	X	X		X	X	X	X
Commercial Development	X	X	X		X	X	X	X
Car Wash Facilities	X	X	X	X	X			
Gas Stations/ Automotive Repair Shops	X	X	X	X	X			
Restaurants			X		X		X	X
Hotels/ Motels			X		X	X		
Shopping Centers	X	X			X			
Streets and Highways	X	X		X	X			

3.5 Snow Disposal Sites

Snow removed from roads and parking lots contains various pollutants including sediment, litter, animal waste, and automotive fluids. Finding a place to dispose of this collected snow can be difficult as the pollutants are easily transported with melt water runoff. The ADEC has developed a guide for the selection, preparation, and maintenance of snow disposal facilities. The guide is available on the ADEC storm water webpage at: http://dec.alaska.gov/water/wnpspc/pdfs/dec_snowdisposal_siting_guidance.pdf and should be

used for all new development or redevelopment projects regulated by the City of Fairbanks and City of North Pole that include a constructed snow disposal facility. Note that normal snow storage areas located on the same property where the snow fell are not considered to be constructed snow disposal facilities.

3.6 Septic Systems

Conventional onsite wastewater disposal systems, or septic systems, are widely used in the urbanized area. Proper installation and care of these systems by homeowners and contractors is an essential part of keeping associated pollutants out of storm water. The ADEC has developed various training programs and manuals on installation and maintenance of these systems. These publications are available on the ADEC onsite disposal systems webpage at www.dec.state.ak.us/water/wwdp/onsite/index.htm and should be used for all new development or redevelopment projects regulated by the City of Fairbanks and City of North Pole that include installation of a septic system.

3.7 Parking Lots

Parking lots can collect sediment, oil, grease, litter, debris, pesticides, and fertilizers, which are often released in large concentrations during spring break-up and summer rain events. In order to protect water quality, permanent storm water treatment BMPs must be included in the PSWCP for parking areas that serve commercial developments or multi-family residential lots. In addition to treatment BMPs, parking lot maintenance practices, such as sweeping, must be addressed.

4. Effective Best Management Practices for Fairbanks

BMPs are the methods or system of methods that developers, operators, or consumers use to control the adverse water quality impacts associated with storm water runoff. BMPs can include the prohibition of certain practices, the use of scheduling and phasing techniques, the development of permanent physical controls, or the establishment of operation and maintenance procedures. BMP selection is based on project type and local environment. As noted in Chapter 3, the urbanized area has unique cold climate characteristics. Specific challenges that must be considered in cold climates include, but are not limited to, the susceptibility of pipes to freezing due to deep winter frost penetration, ice formation on ponded water surfaces, reduction in biological activity due to cooler year-round temperatures, shorter growing seasons, permafrost, frost heaves, and high pollutant loads contained in the spring melt runoff volumes. This chapter lists recommended non-structural and structural BMPs for use in the urbanized area, outlines general BMP performance goals for the urbanized area, and identifies pertinent resources that should be used in the BMP selection process.

4.1 Non-structural Best Management Practices

Non-structural BMPs are management practices that can be implemented without constructing physical improvements. They are designed to prevent or limit the entry of pollutants into storm water runoff and are typically less costly than structural BMPs.

Table 5. Examples of Non-structural BMPs

Type	Examples
Project Design	Preserve natural vegetation
	Utilize buffer zones
	Design improvements with existing topography in mind
	Limit encroachments in natural drainage paths
	Cluster Development
Good Housekeeping	Routinely clean catch basins
	Routinely sweep streets and parking lots
	Place snow storage facilities away from lowlands and water bodies
	Select a proper location and use proper materials for vehicle/equipment washing
	Prepare spill prevention and control plans for liquid storage and handling
	Dispose of trash and debris appropriately
Construction Scheduling or Phasing	Schedule activities to minimize soil exposure during high precipitation periods
	Phase clearing and grading activities to minimize extent of soil exposure

4.2 Structural Best Management Practices

Structural BMPs are physical improvements. They are designed to either reduce the amount of pollutants that accumulate in storm water runoff by reducing the amount of runoff itself or by providing mechanisms to remove and/or treat the pollutants.

Table 6. Examples of Structural BMPs

Type	Examples
Erosion Control or Stabilization	Mark clearing limits
	Surface roughening and terracing
	Mulching
	Temporary seeding or sodding
	Use of manufactured rolled products (nets, blankets, etc.)
Sediment Control	Temporary sediment trap
	Silt fence
	Inlet protection (sandbag filters, catch basin inserts, etc.)
	Brush barriers
	Wattles
	Vehicle tracking entrance/exit
Velocity Control	Slope drains
	Rock flumes
	Outlet protection
	Diffusers
	Storm water conveyance channels
	Rock check dams
Treatment Practices	Bioretention
	Infiltration
	Filtering practices
	Dry ponds
	Grass channels
	Filter strips

4.3 Performance Goals

Temporary BMPs are those utilized during the construction phase of a project. They focus on erosion and sediment control with the goal being to limit erosion and stop sediment from leaving a construction site to the maximum extent practicable. Permanent BMPs are those expected to stay in place for the life of the new or redeveloped facility. They focus on runoff volume and quality control with the goal being to limit and treat post-development runoff to the maximum extent practicable. Table 7 identifies the parameters that should be used to attain these goals (as previously detailed in Section 2).

Table 7. Temporary and Permanent BMP Design Criteria

Category	Design Requirement	Purpose	Criteria
Temporary BMPs	Erosion Control	Limit erosion from the construction site to the maximum extent practicable.	All erosion control BMPs shall be designed to handle the 2-year, 6-hour duration storm event without failure of the BMPs.
	Sediment Control	Remove sediment from runoff from the construction site to ensure the water quality of receiving water(s) will not degrade.	Provide sediment control for all down slope boundaries (i.e. silt fence, vegetative buffer strips, etc.) and, as necessary, provide for storage of runoff.
Permanent BMPs	Runoff Volume	Limit post-development peak runoff to 5% over pre-development peak runoff.	Runoff calculations shall be based on the 10-year, 1-hour duration storm event.
	Runoff Quality	Treat first flush pollutant loading.	Treat the initial 0.5 inch of runoff from each storm event.
		Treat runoff after first flush.	Provide treatment at a minimum rate of 0.005 inches per minute.

4.4Resources

The following resources contain information on non-structural and structural BMPs suitable for the urbanized area, and should be used in the BMP selection process.

- Alaska Storm Water Guide (ADEC, 2011)
  http://www.dec.state.ak.us/water/wnpspc/stormwater/Guidance.html

- BMP Effectiveness Report for Fairbanks (Shannon & Wilson, 2006)
  - http://www.dec.state.ak.us/water/wnpspc/stormwater/AKDEC%20BMP%20Effectiveness%20Report.pdf

- DOT&PF Alaska SWPPP Guide (2017 Ed.)
  - http://www.dot.state.ak.us/stwddes/desenviron/assets/pdf/swppp/english/2016/swppp_guide_with_apdx.pdf

- Stormwater BMP Design Supplement for Cold Climates (Center for Watershed Protection)
  - http://owl.cwp.org/mdocs-posts/caracod-_sw_bmp_design_cold_climates/

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DOT&PF. 2005, January. Alaska Storm Water Pollution Prevention Plan Guide.

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Shannon & Wilson, Inc. 2006, February. BMP Effectiveness Report, 18-9001-15, Fairbanks, Alaska. Alaska Department of Environmental Conservation, Water Quality Program, Fairbanks, Alaska.

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ATTACHMENT A

City of Fairbanks – Storm Water Fee Schedule

Description	Fee	Area of Ground Disturbance
PSWCP Plan Review	$350	1 acre or greater
ESCP Plan Review	$175	10,000 sq. ft. to 1 acre
SWPPP Plan Review	$350	1 - 5 acres
SWPPP Plan Review	$480	5 - 10 acres
SWPPP Site Inspection	$175	1 acre or greater
Cooling Water Discharge to MS4	$500	Annual Fee

City of North Pole – Storm Water Fee Schedule

Description	Fee	Area of Ground Disturbance
PSWCP Plan Review	$300	1 acre or greater
SWPPP Plan Review	$480	1 acre or greater
SWPPP Site Inspection	$240	1 to 5 acres
SWPPP Site Inspection	$480	5 to 10 acres
SWPPP Site Inspection	$720	10 to 20 acres
SWPPP Site Inspection	Actual Cost	Over 20 acres