

# **Anchorage MS4 Street Sweeping Report for 2015**

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MUNICIPALITY OF ANCHORAGE  
WATERSHED MANAGEMENT PROGRAM

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# **Anchorage MS4 Street Sweeping Report for 2015**

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**Prepared for:** Anchorage MS4 Co-Permittees:  
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Municipality of Anchorage

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# ANCHORAGE MS4 STREET SWEEPING REPORT FOR 2015

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# Anchorage MS4 Street Sweeping Report for 2015

## 1. Purpose

Alaska Pollutant Discharge Elimination System (APDES) Permit No. AKS-052558, Article II, Part B, Section 4.d(ii)-(v) requires the permittees, the Municipality of Anchorage (MOA) and the State of Alaska Department of Transportation and Public Facilities (ADOT&PF), to inventory and designate arterial and residential streets and large parking lots within the Anchorage Municipal Separate Storm Sewer System (MS4) for sweeping maintenance; to record and report sweeping performed along these systems on an annual basis; and to annually assess these sweeping practices relative to minimization of pollutant discharges from these systems into receiving waters. Specifically, permittees are required to submit:

- Sweeping maps: each year permittees must submit maps of the streets and parking lots that have been designated for sweeping that year and their proposed sweeping frequency relative to the frequencies specified in this permit. Permittees must also designate those streets that they deem 'technically infeasible' for sweeping.
- Sweeping records: permittees must submit annual records of the sweeping practices used, and the curb miles and volumes of materials swept for street and parking lots organized by sweeping event, general location, and sweeping frequency class. Analyses of particle size distributions for samples representative of swept materials must also be submitted.
- Sweeping assessment: permittees must annually prepare an assessment on the basis of submitted sweeping records of the effectiveness of MS4 sweeping completed that year in minimizing pollutant discharges to storm drains and receiving waters.

The permittees have completed and compiled these inventories, records and assessments and submit summaries of these data and findings in this report in compliance with this permit part. The report is organized into five major sections. Section 1.0 summarizes the purpose of this report. Section 2.0 identifies 2015 swept streets and large public parking lots as well as those streets designated infeasible for sweeping. Section 3.0 summarizes sweeping records for 2015. Section 4.0 summarizes an assessment of the permittees' sweeping effectiveness for this year. Section 5.0 includes maps and additional summary tables described in Sections 2.0 through 4.0.

## 2. Streets and Parking Lots Designated for Sweeping

Permit Part II.B.4.d(i) requires permittees to map all streets and large public parking lots to be swept in the coming year and designate their assigned sweeping frequency relative to permit requirements. Further, Part II.B.4.d(iv) requires that permittees designate streets that are technically infeasible for sweeping and specify why. Finally Part II.B.4.d(v) requires that permittees annually ‘..identify any significant changes..’ in mapping of ‘..residential, arterial, and public parking lots..’ subject to regular sweeping under the permit and ‘..the basis for those changes.’ The following section summarizes this information. Section 2.1 identifies types of streets deemed technically infeasible for sweeping by the permittees. Section 2.2 identifies streets designated for sweeping within each of the permittees’ jurisdictions, and the sweeping management areas (‘general locations’) that the permittees’ use to organize sweeping efforts. Section 2.3 identifies the public parking lots designated as large and swept by the permittees. Any changes in swept features and the basis for those changes are also summarized in Section 2.2 and 2.3.

### 2.1. *Technical Feasibility for Sweeping*

Permittees must document areas where street sweeping is technically infeasible and why (Part II.B.4.d(iv)). The permittees specify the technical infeasibility of regularly sweeping a street based on two factors: surface type and cases where the combined character of speed, access and drainage type make regular sweeping unnecessary, disruptive and/or dangerous.

Unpaved road surfaces are not technically feasible for sweeping. Such surfaces of course will include dirt and gravel roadways but include as well those whose surfaces have been treated with applications of chemicals or asphaltic or other mixtures to create a smooth and temporarily hardened surface. Treatment typically results in only a short-term hardening of the road surface with a primary intent of smoothing the road surface for traffic over the summer season. However, the treatment also serves to temporarily bind particles to reduce dust and erosion. Sweeping can speed deterioration of these surfaces and increase mobilization of fines during runoff. Therefore, these roads are not swept but may be periodically re-graded or re-treated to reduce erosion and dust generation.

High-speed, high-traffic roadways (freeways and expressways), where access is limited and drainage is provided by open channels on both sides of the road, are also not regularly swept. Regular sweeping along these street segments is considered both technically infeasible and unnecessary. Regular sweeping is technically infeasible along these roadway segments because of the speed and volume of the traffic. Regular sweeping activity along these segments would present unpredictable danger to traffic as a slow-speed obstruction. It would also obviously limit for prolonged periods of time the utility of these roadways as high-speed thoroughways. From a more practical standpoint, regular sweeping along these segments is also generally unnecessary. Winter traction sand applications along these segments is less frequently done, significantly reducing sediment loading on the roadway. The sediment that does accumulate is rapidly removed

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by high-speed traffic along these segments. Wind and wheel energy generated by traffic very effectively move particulates off the paved surface and onto vegetated shoulder and median areas where these materials are collected on a seasonal or as-needed basis during shoulder maintenance.

### **2.2. Designated Streets for 2015 Sweeping**

Permittees are required to identify and map all streets designated for sweeping and provide maps of streets swept in an annual report of these activities (II.B.4.d)(i) and (v)). Any changes in swept features and the basis for those changes must also be summarized. Sweeping for different parts of the Anchorage MS4 are performed by different operators, based on the jurisdictions of the MS4 owners (ADOT&PF and MOA) and the maintenance authorities assigned to different operators by the owners. Initial maps of Anchorage MS4 streets and public parking were compiled and submitted in the permittees' document 'Street Sweeping Management Plan: Anchorage MS4, November 2011', Appendix A (hereinafter, MS4 Sweeping Plan or Sweeping Management Plan).

Through various means the owners, MOA and ADOT&PF, assign maintenance administrative authorities for the Anchorage MS4 to different agencies. Each maintenance administrative agency is assigned a specific geographic area covering different portions of the Anchorage MS4 and public parking facilities. ADOT&PF assigns maintenance authority for its entire Anchorage MS4 jurisdiction to its Maintenance & Operations Division, Central Region (ADOT&PF). MOA assigns maintenance authorities for various portions of its MS4 jurisdiction to different roads and drainage 'service areas', or to particular segments of streets and roads, through Municipal administrative and Assembly-codified authorizations. The primary maintenance administrative authorities (maintenance operators) for the Anchorage MS4 facilities regulated under II.B.4.d) include:

- The MOA Public Works Maintenance & Operations Division (ARDSA)
- The MOA Chugiak Eagle River Rural Road Service Area (CBERRRSA)
- The MOA Public Works Administration Division (PWA)
- The MOA Anchorage School District (ASD)
- The MOA Parks and Recreation Department (Parks).

Individual maintenance administrative authorities may further divide their assigned regions into smaller operational areas, which are roughly equivalent to the 'general locations' as specified in the permit at II.B.4.d.(v). These operational areas are used in this document as the basis for permit-required sweeping reporting. Each maintenance authority also designates streets within its region for sweeping (based on guidelines provided by the MS4 owners and as required by the MS4 storm water permit). Operational areas ('general locations') are shown in Figure 5-1 and streets that were designated for sweeping in 2015 are shown in Figures 5-2 through 5-8 in Section 5.1 for each of the primary maintenance administrative agencies for the Anchorage MS4.

Changes in mapping of streets designated for sweeping have been made during the 2015 reporting period reflecting changes in features swept. Changes in streets swept are tabulated in Table 5-11 in Section 5.2.5 and are summarized below.

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In 2015 ARDSA reported no changes in management practices or streets designated for sweeping from its 2014 reporting period.

In 2015 ADOT&PF reported no changes in management practices or streets designated for sweeping from its 2014 reporting period.

In 2015 CBERRRSA added 13 new street segments to its sweeping list (Table 5-11) as a result of changes in sweeping feasibility (road surfacing changes and new road construction). CBERRRSA reported 243 street segments had a change in sweep practice in 2015 in order to increase overall sweeping efficiency. All 243 of those segments were swept using kick brooms in 2014, and were swept using mechanical sweepers and tandem vacuum trucks in 2015 (and will remain on CBERRRSA's pick up broom sweep list in future years). Sweeping these street segments using mechanical sweepers and tandem vacuum trucks (rather than using kick brooms) should allow for additional sediment removal from the street surfaces and may translate to less maintenance of open channel drainage ditches adjacent to these street segments.

### **2.3. Designated Large Public Parking Lots**

Section II.B. 4.d specifies that permittees must identify and designate those large parking lots for sweeping that serve schools, cultural facilities, plazas, sports and event venues and similar facilities. The permittees have interpreted a large public parking lot to be any such lot that has a total exposed parking footprint within a single parcel or a complex of closely associated parcels of 2 acres or larger (see the Anchorage MS4 Sweeping Plan, p4).

ADOT&PF identified no ADOT&PF-owned public parking lots that met these criteria. MOA identified 62 large public lots meeting these criteria. Maps showing location of these lots are included as Appendix C in the MS4 Sweeping Plan. The designated MOA large public parking lots serve 51 schools, 9 parks, one cultural facility and one events venue. The median size of all 62 designated MOA large public parking lots is 2.5 acres. The largest lot is approximately 13.3 acres in size with only four lots 10 acres or larger in size. Four of the designated lots are between 5 and 10 acres in size, 15 lots are 3 to 5 acres in size, and 39 lots are 2 to 3 acres in size. No changes were made to the large parking lot sweeping list for 2015. Table 2-1 below lists all large public parking lots currently identified by the permittees.



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**Table 2-1 Large Public Parking Lots (MOA)**

Name	Type	Area, ft <sup>2</sup>
Hilltop Ski Area	Park	88000
Ravenwood Elementary	School	89075
Girdwood K-8 School	School	89969
Davis Park	Park	90000
Muldoon Elementary	School	92049
Turnagain Elementary	School	93900
Susitna Elementary	School	94200
Harry J. McDonald Memorial Center	Park	95000
Mountain View Elementary	School	95101
Huffman Elementary	School	95228
Ruth Arcand Park	Park	96000
Rogers Park Elementary	School	96305
Polaris K-12 School	School	97293
Wonder Park Elementary	School	97567
Williwaw Elementary	School	97956
O'Malley Elementary	School	98189
Bear Valley Elementary	School	98474
Rabbit Creek Elementary	School	99865
Far North Bicentennial/ Hillside Park	Park	100500
Mears Middle School	School	102000
Alpenglow Elementary	School	102825
Trailside Elementary	School	103834
Campbell Elementary	School	104000
Eagle River Lion's Club	Park	104000
Gladys Wood Elementary	School	104344
Bowman Elementary	School	106000
Spring Hill Elementary	School	106000
Lake Otis Elementary	School	106173
North Star Elementary	School	106780
Bayshore Elementary	School	106792
Northern Lights ABC School	School	108974
Albrecht Field	Park	113300
Lake Hood Elementary	School	114600
Central Middle School/Chugach Optional Elementary	School	116792
Northwood ABC Elementary	School	118491
Birchwood ABC Elementary	School	119236
Kasuun Elementary	School	119441
Tyson Elementary	School	120690
Willow Crest Elementary	School	124285
Russian Jack Elementary	School	128685
South Anchorage Sports Park	Park	140000
Chugiak Elementary	School	140875
Loussac Library	Cultural	141000
King Career Center	School	144663
Kincaid Park	Park	145000
Gruening Middle School	School	150000
Kincaid Elementary	School	152789
Clark Middle School	School	168224
Hanshaw Middle School	School	169175
Romig Middle/ West High Schools	School	176826
Begich Middle School	School	177442
Wendler Middle School	School	193293
Goldenview Middle School	School	201993

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Name	Type	Area, ft <sup>2</sup>
Mirror Lake Middle School	School	203260
Eagle River High School	School	275595
Chugiak High School	School	325000
South High School	School	340669
Bartlett High School	School	412961
Sullivan/Boeke Arenas	Events	457000
East High School	School	459000
Service High School	School	473795
Dimond High School/Chinook Elementary	School	580883

### **3. 2015 Sweeping Performance Reports**

Permit Part II.B.4.d)(v) requires permittees to report sweeping performance annually in terms of specific factors and to assess sweeping effectiveness in minimizing discharge of pollutants to storm drains and creeks based on those factors. Sweeping performance reports must at minimum identify and map the actual streets and parking lots that were swept in the reporting year. In addition, permittees must compile and report specific sweeping performance factors including:

- Sweeping practices used,
- Swept ‘curb miles’
- Volume or weight of swept materials, and
- Particle size distributions of representative swept materials.

The permit specifies that sweeping performance information is to be organized and reported, in some respect, by date, general location, and sweeping ‘frequency category’ (defined in the permit as Arterial or Residential streets, and Parking). However, whatever the exact organizational structure elected by the permittees for the performance report information, all these factors are specifically to be used in assessing the effectiveness of MS4 sweeping on limiting discharge of pollutants to the MS4 and receiving waters. This section summarizes sweeping performance records sorted by maintenance agency for both streets (Subsection 3.1) and parking (Subsection 3.2). Subsection 3.3 describes particle size distribution measures for street materials collected during the 2015 sweep periods. In Section 4, we use these performance records, along with other information, to assess effectiveness of the 2015 MS4 sweeping program.

#### **3.1. Street Sweeping Performance Reports for 2015**

The permittees have organized their sweeping performance data to reflect both significant differences in drainage types across the MS4 and variations in street sediment loading between those drainage types. As described in their MS4 Sweeping Plan, the permittees may use different sweeping practices for streets having curb and gutter (CG) drainage as opposed to those having open channel (OC) or ditch drainage. For streets with curb and gutter drainages, sediments are concentrated along the gutter pan and readily available for mobilization in washoff events. For these streets, swept materials are always collected during sweeping, and the removed volumes can be readily inventoried. Conversely, sediments from streets with open channel drainages tend to become concentrated onto the adjacent vegetated shoulders where runoff events are much less likely to mobilize them. Along these streets the most common sweeping practices are ones that ‘kick’ the sediments left on the street pavement onto the same vegetated shoulder (to be removed during later shoulder maintenance and ditch ‘dressing’). As a result, inventories of the volumes of sediment swept from a large portion of open channel street segments are usually not available, at least not as part of sweeping performance records.

Given these practices, reporting sweeping information for curb miles alone, as the permit specifies, is problematic. Reporting only those streets having ‘curb miles’ (i.e., curb and gutter type streets) as specified in the permit would obviously bias measurement of total Anchorage MS4 sweeping performance. Similarly, using total street miles when

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assessing the total volume of swept materials will bias loading and efficiency estimates when the only swept sediment volumes recorded are for curb and gutter streets but open channel street miles are included in the analysis. Finally, potential for biasing analysis is even further compounded considering differences in sediment loading between drainage types (and sweeping frequency categories).

To control for these sweeping practices and characteristics, sweeping performance information for Anchorage MS4 streets is collected and sorted by a number of factors. These include sweeping frequency type and drainage type, the MS4 maintenance operator, the sweeping event (measured by the sweeping completion date range; spring, summer, fall), and the operational area ('general location'). Sweeping frequency types include 'Arterial' and 'Residential' categories as already described in the permittees MS4 Sweeping Plan.

Sweeping performance information reported for the Anchorage MS4 includes total swept volumes (in cubic yards) referenced to operational areas ('general locations' in the permit language) and to 'Street Miles', 'Curb Miles', and/or 'Pick Up Miles'. 'Street Miles' for all designated swept streets are included in this performance report and are calculated as the total centerline lengths of swept street segments. Where a 'kick' type of sweeping practice is used along open channel roads (i.e., swept sediments are not collected), total swept volume will not be known and Street Miles is the only sweeping information reported. Any estimate of swept volumes for these streets must be calculated using the swept mileage and an estimate of street sediment loading present at the time of the sweeping event for the particular sweeping frequency category (arterial or residential). Because sweep practices that collect swept material (i.e., swept volumes are inventoried) are used on both curb and gutter and open channel drainage type roads, the term 'Pick Up Miles' is more appropriate and used in place 'Curb Miles' for this report. Pick Up Miles optimally represent the total actual length of road shoulder swept, for the case of open channel road segments, and the actual length of curbed drainage swept, for curb and gutter road segments. Where this is not known, Pick Up Miles are estimated as twice the length of the swept streets along which the sediments are collected. Where possible, the Anchorage MS4 sweeping performance report also includes an estimate of the unit swept volume (cubic yards per Pick Up Mile) for each combination of frequency type and drainage type.

2015 sweeping performance records for the principle Anchorage MS4 street maintenance operators (ADOT&PF, ARDSA, and CBERRRSA) are summarized for all three sweeping events in Table 3-1 below. Note that the two tandem sweeps required for arterial frequency category streets are summarized under the single spring event shown. Operational areas ('general locations') for these maintenance operators are as described in Section 2.2 and shown in Figure 5-1. More detailed sweeping summary tables for each of the maintenance operators are included in Section 5.2, including all required permit reporting elements.

In general in 2015 all Anchorage MS4 operators completed sweeping of designated streets in accordance with permit requirements using the various practices as described in

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the previously published MS4 Sweeping Management Plan. Sweeping completeness for designated streets overall was high though this varied somewhat from operator to operator (see detailed records for each operator in Section 5.2).

**Table 3-1 Anchorage MS4 Sweeping Summary, 2015**

<b>Spring 2015</b>							
	<b>EPA Category</b>	<b>Drainage Type</b>	<b>Street Miles</b>	<b>PickUp Miles</b>	<b>Total volume* (cyds)</b>	<b>Unit volume* (cyds/mile)</b>	
<b>DOT</b>	<b>Arterial</b>	OC	8.1	10.3	110.0	10.7	
		CG	39.6	103.8	2563.0	24.7	
		Mixed	46.2	121.3	2918.0	24.0	
		<b>Total</b>	<b>93.9</b>	<b>235.4</b>	<b>5591.0</b>	<b>23.8</b>	
	<b>Residential</b>	OC	51.7	103.3	576.0	5.6	
		CG	3.1	9.9	166.0	16.7	
		Mixed	28.4	59.0	507.0	8.6	
		<b>Total</b>	<b>83.1</b>	<b>172.2</b>	<b>1249.0</b>	<b>7.3</b>	
	<b>ARDSA</b>	<b>Arterial</b>	Mixed	45.8	91.6	1971.4	21.5
		<b>Residential</b>	Mixed	580.6	1161.3	9877.9	8.5
<b>CBERRRSA</b>	<b>Residential</b>	OC	114.9	128.2	531.0	4.1	
		CG	33.1	66.2	420.0	6.3	
		Mixed	51.8	103.5	174.0	1.7	
		<b>Total</b>	<b>199.8</b>	<b>298.0</b>	<b>1125.0</b>	<b>3.8</b>	
<b>Summer 2015</b>							
	<b>EPA Category</b>	<b>Drainage Type</b>	<b>Street Miles</b>	<b>PickUp Miles</b>	<b>Total volume* (cyds)</b>	<b>Unit volume* (cyds/mile)</b>	
<b>DOT</b>	<b>Arterial</b>	OC	8.1	10.3	46.0	1.7	
		CG	39.6	103.8	563.0	5.4	
		Mixed	46.2	121.3	511.0	4.2	
		<b>Total</b>	<b>93.9</b>	<b>235.4</b>	<b>1120.0</b>	<b>4.8</b>	
	<b>Residential</b>	OC	51.7	103.3	656.0	6.4	
		CG	3.1	9.9	117.0	11.8	
		Mixed	28.4	59.0	391.0	6.6	
		<b>Total</b>	<b>83.1</b>	<b>172.2</b>	<b>1164.0</b>	<b>6.8</b>	
	<b>ARDSA</b>	<b>Arterial</b>	Mixed	45.8	91.6	230.0	2.5
		<b>Residential</b>	Mixed	580.6	1161.3	179.8	0.2
<b>CBERRRSA</b>	<b>Residential</b>	OC	114.9	128.2	No Data Reported		
		CG	33.1	66.2	No Data Reported		
		Mixed	51.8	103.5	No Data Reported		
		<b>Total</b>	<b>199.8</b>	<b>298.0</b>			

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Fall 2015							
	EPA Category	Drainage Type	Street Miles	PickUp Miles	Total volume* (cyds)	Unit volume* (cyds/mile)	
DOT	Arterial	OC	8.1	10.3	38.0	3.7	
		CG	39.6	103.8	683.0	6.6	
		Mixed	46.2	121.3	849.0	7.0	
		Total	93.9	235.4	1570.0	6.7	
	Residential	OC	51.7	103.3	703.0	6.8	
		CG	3.1	9.9	135.0	13.6	
		Mixed	28.4	59.0	458.0	7.8	
		Total	83.1	172.2	1296.0	7.5	
	ARDSA	Arterial	Mixed	45.8	91.6	118.8	1.3
		Residential	Mixed	580.6	1161.3	2509.5	2.2
CBERRRSA	Residential	OC	47.9	22.9	6.0	0.3	
		CG	5.1	10.1	24.0	2.4	
		Mixed	146.1	292.6	63.0	0.2	
		Total	199.0	325.5	93.0	0.3	

\* Volumes represent only swept materials collected along reported/estimated Curb/PickUp Miles  
 OC = Open Channel Drainage  
 CG = Curb and Gutter Drainage

For 2015 ADOT&PF reported 100% completeness for all road segments and operational areas for the spring, summer, and fall sweep periods. CBERRRSA reported 100% completeness for the spring and fall sweep periods with no reported road segments or operational areas falling below permit requirements. For the 2015 summer sweep period CBERRRSA reported that roads were swept 'as needed' (as prescribed in the Street Sweeping Management Plan) and did not report any volumes of swept materials. This suggests that only open channel type roads swept with kick broom type sweepers were swept in the summer period. ARDSA reported a sweeping completeness of 100% for designated streets within its administrative authority for the 2015 spring and summer sweep periods. For the 2015 fall sweep period ARDSA reported 100% completeness for all Residential type roads, and all Arterial type roads located in area Units 3 & 4, within its administrative authority. ARDSA reported that Arterial type roads in area Units 1 and 2 were not swept during the fall sweep period in 2015. ARDSA reported that heavy rains in late September made sweeping inefficient to nearly impossible, due to sweeper hoppers filling quickly with water, as well as diverting crews to assist in flooding and pothole filling operations. Early October icing conditions made sweeping higher speed Arterial roads dangerous as well; also contributing to deficiencies in the completeness of the fall Arterial sweep. Despite these deficiencies, ARDSA reported spot sweeping and additional passes (beyond what is prescribed in the Street Sweeping Management Plan) performed during the summer sweep period had already collected the majority of the dirt load that would have been collected in the fall sweep period.

### 3.2. Parking Lot Sweeping Performance Report for 2015

Sweeping performance was reported by the Anchorage School District for all 51 public schools on the large public parking lot list as designated in Section 2.3, for a completion

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of 100%. No basis for changes in number of swept school parking lots was otherwise submitted. Exact sweeping dates were not reported, though separate volumes of swept material were reported for two sweeping periods, spring and fall, indicating that each of the 51 school lots were swept twice in 2015. Reported total swept volumes for individual parking lots ranged from 6 to 85 cubic yards per lot, for a total of 1168 cubic yards collected during 2015 sweeping efforts (roughly 6.2 cubic yards per acre of parking lot area for the year). Detailed sweeping reports for the large school parking lots are included in Section 5.2. No other reports were submitted for sweeping performed in 2015 for the other large public parking lots as listed in Table 2-1.

### 3.3. Particle Size Distributions for Swept Materials

Permit requirements at II.B.4.d)(v) require that particle size distribution be evaluated for a representative sample of swept materials. Representative samples of swept street materials (no samples were available from parking lots) were collected by subsampling temporary sweeping storage piles built up by MS4 operators and the samples were then submitted to a certified laboratory for analysis. Particle size distributions representative of samples collected during 2015 sweeping events are included in Figure 3-1 below.

Figure 3-1 Representative PSD of Swept Materials

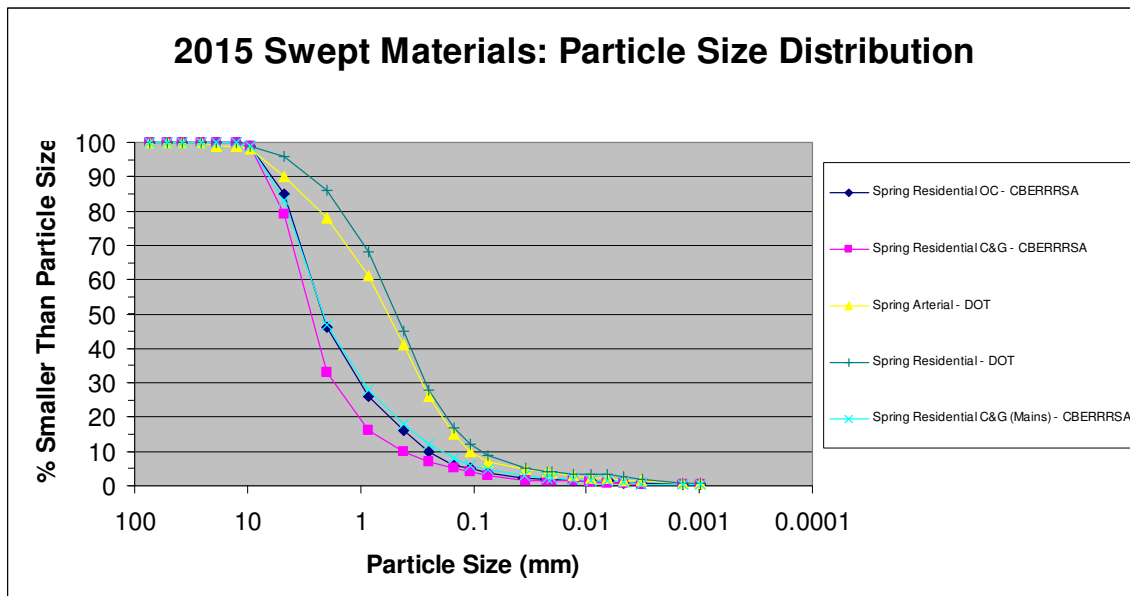


Figure 3-1 includes particle size distributions (PSDs) of samples collected from temporary storage piles generated from street sweeping. In 2010 and 2011, samples were collected from street surfaces before and after each sweeping event, in order to compare pre- and post-sweep street conditions. Analysis of data suggests reduced sweeping practices efficiency in removing the mid-range fine particles—from about 75 to 1000 micron. Available data are inconclusive for estimation of sweeping efficiencies for very fine particles (finer than 75 micron) but do suggest that current sweeping practices may have limited competency at removing particles smaller than 75 micron. Assessment of removal rates for these fine particles would require more resolute sampling for street-collected samples (use of vacuum sampling techniques).

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Particle size distributions for 2015 swept materials, collected from street sweeping temporary storage piles, show similar data ranges, and appear to be grouped somewhat by operator. Dirt from CBERRRSA's piles appears to have the highest proportion of coarse grained materials, with ADOT&PF having the highest proportion of fined grained materials. This is likely due to differences in original purchase specifications for winter traction sand and to the differences in road speeds typical of each operator's jurisdiction.



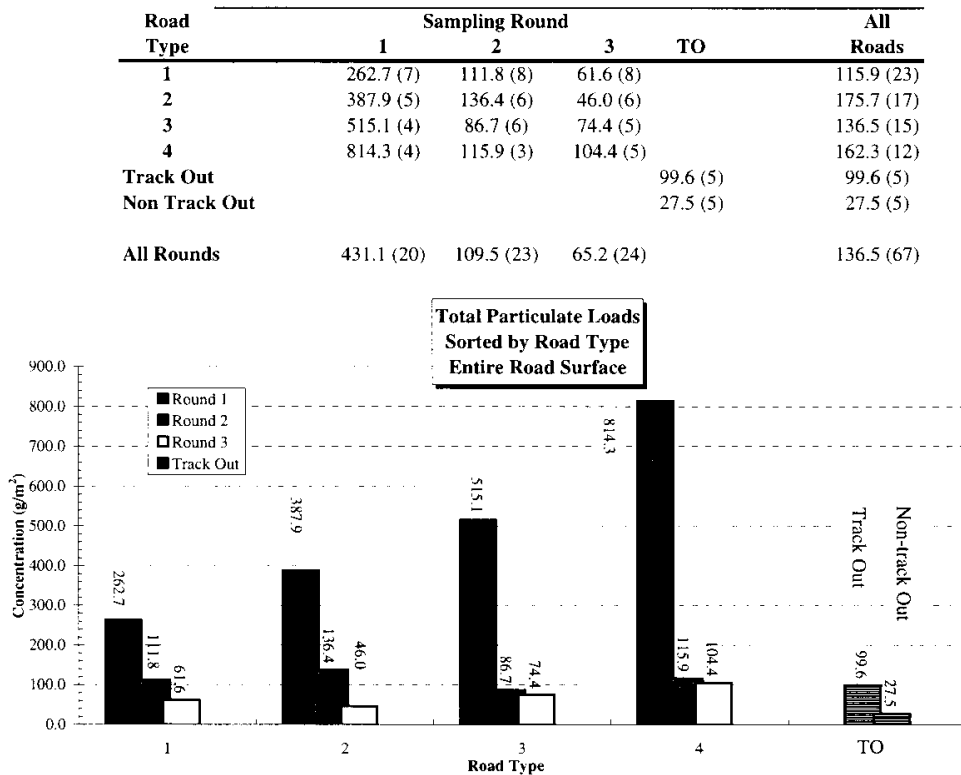
## 4. 2015 Sweeping Performance Assessment

Part II.B.4.d)(v) requires the permittees to ‘perform annual assessments of street sweeping effectiveness to minimize pollutant discharges to storm drains and receiving waters on the basis of the performance factors required to be reported under the permit. To help in this assessment the permittees completed additional sampling of street sweeping activities in 2010, 2011, and 2013 and reviewed sampling efforts and studies performed under earlier Anchorage MS4 permit terms and in other areas nationwide. Section 4.1 summarizes these additional efforts relative to the permittee’s 2013 street sweeping performance. Section 4.2 provides a comparison of unit loads (cubic yards per pick up mile and pounds per pick up mile) for swept dirt for the past three years (2012-2014). Based on both this additional information and current performance reports, Section 4.3 summarizes the effectiveness of the permittees’ 2014 sweeping program as required under Part II.B.4.d)(v).

### 4.1. Summary of Findings from 2013 & Previous Sweeping Assessments

Street sediment loading data collected in 2011, 2013, and in previous Anchorage permit terms were used to support assessment of sweeping effectiveness in 2014 for the Anchorage MS4. These additional data are briefly summarized in this section.

Figure 4-1 Anchorage Street Sediment Loading Data: 1996



Road type: 1-Residential, 2-Collector, 3-Minor Arterial, 4-Major Arterial; all curb & gutter  
 Rounds: 1-winter initial load, 2-post spring sweep, 3-mid-summer  
 From: “MOA Street Sediment Loading Assessment”, WMP AP#97001, 1997

## **Anchorage MS4 Street Sweeping Report for 2015**

The permittees have collected significant data characterizing street sediment loading (at similar street strata) and street sweeping performance (at the resolution of overall local practices). Significant street sediment sampling efforts were conducted in 1996 (WMS document WMP APr97001, “MOA Street Sediment Loading Assessment”) and again in 2000 (WMS document WMP APr00003, “Street Sediments and Adsorbed Pollutants”) during the permittees’ first permit term. Later analyses of these data by the permittees specifically addressed street sediment buildup rates (Wheaton et al., op. cit.) and effectiveness of Anchorage street sweeping performance (WMS document WMP APr02002, 2002, “Anchorage OGS and Street Sweeping as Storm Water Controls”). Sampling in all earlier studies was performed only along curb and gutter type drainages and no data was collected for open channel roads. Nevertheless, data for curb and gutter drainage types was thorough and no significant changes have been made in application rates or practices for street sanding since these studies were completed. The sediment loading results reported in the 1996 study is summarized in Figure 4-1. Street sediment loading values in pounds per pick up mile can be approximated by multiplying the gm/m<sup>2</sup> values in Figure 4-1 by 51.2 for residential and collector streets and 77.7 for arterial streets.

The Watershed Management Services section of the Municipality performed additional sampling during 2010 and 2011 to supplement the earlier street sediment loading data and to complement the detailed sweeping performance data collected by the MS4 maintenance operators. Sampling program goals were to approximately quantify sweeping efficiencies and sediment buildup rates between scheduled sweeping events. The sampling strategy applied was to characterize the initial street sediment loading conditions prior to any seasonal sweeping and then estimate sediment loads remaining after each of the seasonal sweeps (relative to each of the major road and drainage type categories).

To achieve this, during the 2010 and 2011 sweeping season WMS sampled transects across select MS4 streets at a total of 118 stations. The stations were selected to broadly represent street frequency category and drainage types (arterial open channel, arterial curb & gutter, collector open channel, collector curb & gutter, residential open channel and residential curb & gutter) from the jurisdictions of all the Anchorage MS4 maintenance operators.

At each station, WMS swept transects 1.5 feet wide across the paved road and gutter/paved shoulder surfaces from centerline, or median curb, to outside curb or edge of paved shoulder, (i.e., one-half of the full curb-to-curb road width at the station) and collected and bagged the materials for later analysis. A systematic photographic record was also made of conditions at each site. Sampling was scheduled at each station immediately prior to initial spring sweeping (to capture the entire winter sediment load remaining on the street after breakup), and then shortly after each of the spring, summer and fall sweep events to measure the sediment load remaining on the street surfaces after sweeping had been completed (based on volumetric analysis of mineral and organic content).

## Anchorage MS4 Street Sweeping Report for 2015

Sampling was performed under dry conditions, to the extent possible, to minimize water content of the collected transect samples. Street sediment samples collected from each swept transect were analyzed by transferring the sample to a graduated cylinder, consolidating the sample by lightly tapping the cylinder, and measuring the total sample volume, in milliliters. After the initial volumetric measurement was made, samples were gently shaken in the cylinder to promote gravimetric separation of any fibrous organics from mineral constituents. Measurements were then made of the volumes of separated fractions of organic and mineral materials. Select samples and composited samples of collected street sediments were also submitted for laboratory testing for coarse- and fine-grain particle size distribution and organic content (by ignition). All results were tabulated and digitally archived.

Quality control review of all data suggests a reasonably comparable, complete, and representative data set was obtained. However, sample populations were small for some street categories, weakening inferences drawn from analyses of a fraction of the collected data. Specifically, small sample populations for some street and drainage categories resulted from a variation in sample collection protocols for these streets. As a result, some of the total sample counts ('n') were significantly reduced for some event/categories (Table 4-1). Specifically, the arterial curb and gutter category for all events is represented by a small sample population count of 7. As a result of the low sample counts, the arterial curb and gutter data may not be adequate to resolve the normal character of street sediment for this street category. Otherwise, sample populations for all other sweeping event/street categories are considered adequate to provide reasonably representative information at the exploratory level of this investigation.

Summary statistics of the sampling results are tabulated in Table 4-1 below. Original WMS street dirt sampling data is in units of milliliters per 1.5 foot transect sample collected across one-half the curb-to-curb road width at the sample station. However, for ease of comparison to the permittees' street sweeping performance statistics (Section 3) these measurements have been normalized to a 'unit load' in the table in terms of pounds per pick up mile. Normalization was done by assuming a porosity for the samples of 0.26 and a specific gravity for the solid materials of 2.67, and then adjusting for the sampled transect area using the following formulas:

$$(\text{mL sample}/1.5' \text{ transect})(0.74)(2.67\text{gm}/\text{cm}^3)(\text{cm}^3/\text{ml})(1\text{lb}/454\text{gm}) = \text{lbs sample}/1.5' \text{ transect}$$

$$\Rightarrow (\text{lbs sample}/1.5' \text{ transect})(5280'/\text{pick up mile}) \cong \text{lbs}/\text{pick up mile}$$

Similarly, cubic yards/pick up mile as reported in the performance summary in the preceding section can be approximately converted to pounds per pick up mile, correcting for voids and neglecting the weight of any water content, as follows:

$$(\text{cyd}/\text{pick up mile})(27\text{ft}^3/1\text{cyd})(2.67)(0.74)(62.4\text{lbs}/\text{ft}^3) = \text{lbs}/\text{pick up mile}.$$

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**Table 4-1 2011 Street Sediment Loading Sampling Results**

		<u>Spring</u>	<u>Spring</u>	<u>Summer</u>	<u>Fall</u>		
		<u>Pre-Sweep</u>	<u>Post-Sweep</u>	<u>Post-Sweep</u>	<u>Post-Sweep</u>		
		Unit Load	Lbs/pu mile	Lbs/pu mile	Lbs/pu mile	Lbs/pu mile	
<b>ARTERIAL</b>	<b>OC</b>	<i>Min</i>	704	168	0	0	
		<i>Max</i>	37531	5361	1348	2420	
		<i>Median</i>	13021	2022	352	827	
		<i>n</i>	23	23	19	23	
	<b>C&amp;G</b>	<i>Min</i>	2052	337	459	337	
		<i>Max</i>	51900	6280	7812	7353	
		<i>Median</i>	8885	995	1470	1876	
		<i>n</i>	7	8	8	8	
	<b>COLLECTOR</b>	<b>OC</b>	<i>Min</i>	612	0	0	0
			<i>Max</i>	15012	827	1011	1271
<i>Median</i>			7582	444	260	321	
<i>n</i>			16	16	16	16	
<b>C&amp;G</b>		<i>Min</i>	2757	367	0	0	
		<i>Max</i>	24510	2634	2144	1041	
		<i>Median</i>	9421	1087	467	390	
		<i>n</i>	18	24	24	24	
<b>RESIDENTIAL</b>		<b>OC</b>	<i>Min</i>	0	0	0	0
			<i>Max</i>	17463	2022	2236	1654
	<i>Median</i>		2451	781	643	474	
	<i>n</i>		24	24	24	24	
	<b>C&amp;G</b>	<i>Min</i>	2068	0	0	122	
		<i>Max</i>	16544	3768	3829	1960	
		<i>Median</i>	5821	1041	919	643	
		<i>n</i>	21	21	21	21	

Sampling units – ml sediment/(1.5' wide transect)(½ width curb-to-curb); Unit load – pounds/pu mile; n – sample count

Note that the sediment load per pick up miles presented here is generally as described earlier, representing the total sediment present along a road segment, relative to the total length of curb or paved shoulder present along that road segment. For our sampling we make the assumption that the total length of curb or paved shoulder along our sampled roads is twice the length of the road (i.e., only two curbs are present along the road). Also note that the term 'pick up mile' in our sampling is used as a generic term to refer to both Curb Miles and Pick Up Miles defined earlier for curb and gutter and open channel drainage types, respectively. Finally note that we have not controlled for pavement width (for example, the number of traffic lanes, parking lanes, turn-out lanes, median lanes, etc.) except for that that is inherent in the sweeping frequency categories used (arterial or

## **Anchorage MS4 Street Sweeping Report for 2015**

residential). However, at the scale of this analysis (areawide and at two levels of traffic load), we believe these data to be usefully representative.

In 2013 sampling of street sediment was conducted to estimate sediment loading and the character of particulates on Anchorage streets, relative to street sweeping practices. Ten 300-500ft long arterial stations and fifteen 300ft long residential stations were selected from amongst swept streets in the Anchorage Bowl. Stations were divided up into 1ft transect intervals and ten 0.5ft transects along each station were selected at random for sampling. At each transect street sediment samples were collected, from centerline to curb (half the total curb to curb width), using a high velocity backpack mounted vacuum with a custom nozzle modified to collect material from a 0.5ft swath. Sample materials collected were labeled and bagged and transported to a local certified material testing laboratory to be dried and weighed. Using the laboratory data, unit loading (grams/meter<sup>2</sup>) and liner loading (pounds/full width curb mile) were then calculated. Arterial stations were sampled 3 times and residential stations were sampled 4 times through out the 2013 sweep season, with transects selected at random for each event.

Results of the 2013 sampling efforts showed median values for 2013 post-sweep loadings were approximately 2300 lbs/full width curb mile for residential streets and 4100 lbs/full width curb mile for arterial streets (total sediment load across entire curb to curb width for one linear mile of road surface). For more information regarding the 2013 sampling program and results please see WMS document WMP Apr14001, "Anchorage Street Sweeping and Storm Water Controls: 2013 Performance Evaluation" (Appendix E-2 of the 2013 APDES report).

# Anchorage MS4 Street Sweeping Report for 2015

## 4.2. Unit Load Comparison 2013-2015

Swept volume data, collected over the past three years, have been analyzed and where possible have been converted to unit load values (cubic yards/pick up mile), to give a measure of what volume of dirt is being swept up per pick up mile for each different operator and sweep frequency category. Cubic yards per pick up mile can then be converted to pounds per pick up mile using the formula described in Section 4.1. Table 4.2 shows unit load in cubic yards per pick up mile for the spring, summer, and fall sweep periods for 2013, 2014, and 2015.

**Table 4-2 2013-2015 Unit Load Comparison**

Spring		Spring 2015		Spring 2014		Spring 2013	
Operator	EPACategory	DrainageType	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)
DOT	Arterial	OC	10.7	11.8	11.9		
		C&G	24.7	25.1	36.0		
		Mixed	24.0	24.9	27.3		
		All	23.8	24.1	30.5		
	Residential	OC	5.6	8.1	6.3		
		C&G	16.7	18.7	18.4		
		Mixed	8.6	8.8	8.6		
		All	7.3	9.0	7.9		
ARDSA	Arterial	Mixed	21.5	21.0	28		
		Residential	8.5	10.5	16.3		
CBERRRSA	Residential	OC	4.1	3.0	4.0		
		C&G	6.3	8.0	9.1		
		Mixed	1.7	2.5	2.0		
		All	3.8	3.7	5.5		

Summer		Summer 2015		Summer 2014		Summer 2013	
Operator	EPACategory	DrainageType	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)
DOT	Arterial	OC	1.7	3.7	2.7		
		C&G	5.4	5.1	4.5		
		Mixed	4.2	5.0	4.9		
		All	4.8	5.0	4.7		
	Residential	OC	6.4	7.2	2.8		
		C&G	11.8	10.9	5.3		
		Mixed	6.6	8.3	4.2		
		All	6.8	7.8	3.4		
ARDSA	Arterial	Mixed	2.5	1.0	3.7		
		Residential	0.2	0.3	1.4		
CBERRRSA	Residential	OC	-	-	-		
		C&G	-	-	-		
		Mixed	-	-	-		
		All	-	-	-		

Fall		Fall 2015		Fall 2014		Fall 2013	
Operator	EPACategory	DrainageType	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)	UnitVolume(cyds/mile)
DOT	Arterial	OC	3.7	3.7	3.5		
		C&G	6.6	6.2	7.9		
		Mixed	7.0	6.6	6.0		
		All	6.7	6.2	6.7		
	Residential	OC	6.8	6.8	3.3		
		C&G	13.6	11.5	6.1		
		Mixed	7.8	8.4	4.3		
		All	7.5	7.7	3.8		
ARDSA	Arterial	Mixed	1.3	2.4	1.7		
		Residential	2.2	4.6	3.7		
CBERRRSA	Residential	OC	0.3	0.0	0.9		
		C&G	2.4	1.2	1.5		
		Mixed	0.2	0.3	0.6		
		All	0.3	0.3	0.7		

## **Anchorage MS4 Street Sweeping Report for 2015**

There is some variability within operator and sweep frequency categories from year to year, but overall, the unit load values suggest a fairly consistent range of dirt loading over the past three years.

### **4.3. Sweeping Effectiveness Assessment for 2015**

Sweeping effectiveness can be related to potential for receiving water impact by a number of relationships illustrated by this data and other data presented in this report. The spatial relationship of street drainage to receiving waters and to the total sediment load present on those streets is an important factor. Performance records summarized in Section 3.1 along with operation maps included in Section 5 provide insight to the potential for street sediment loads to wash off into Anchorage storm drains and receiving waters based on these spatial relationships. Of the three reporting MS4 operators, ARDSA sweeps the most street miles at approximately 626 miles (about 580 miles of residential streets and 46 miles of arterial streets), with CBERRRSA second at 200 street miles (all residential), and ADOT&PF third with about 177 street miles (94 miles arterial and 83 miles residential). Distribution of these contributing surfaces varies even more significantly between the operators. ADOT&PF and CBERRRSA streets are spread across large geographic areas. For ADOT&PF jurisdiction, streets extend across the entire Municipality and most of its watersheds. Despite its relatively small streets inventory, CBERRRSA's operational areas also cross a large number of watersheds. However ARDSA's operational area, although including the largest street inventory, is significantly more compact, with the result that ARDSA streets drain across a much smaller number of watersheds than either of the other two primary Anchorage MS4 operators.

Overall, sweeping efficiencies are high for the spring sweep period. These high efficiencies are believed to be due to the high sediment loadings on the street surfaces. This is particularly notable for the spring sweeps when initial loads are the highest, representing traction sanding loads accumulated over the entire winter. As a result spring sweeping efficiencies historically exceed 90 percent. The results of 2013 residual sampling reflected a removal rate of approximately 95% for arterial streets and 70% for residential streets for the 2013 spring sweep period. Overall, average unit loads were down slightly in spring 2015 from spring 2014 for all road types and frequency categories for DOT swept roads. Spring ARDSA residential unit load in 2015 was down from 2014 and 2013, while arterial unit load was nearly the same as in 2014 and down from 2013. Spring CBERRRSA unit loads on average were about the same as in 2014 and down from 2013.

Sweeping efficiencies for later events are somewhat reduced but include sweeping removal rates that still reflect relatively large sediment loads varying from approximately 1.3 to 5.4 cubic yards per pick up mile for arterial streets and 0.2 to 13.6 pounds per pick up mile for residential/collector streets for the 2015 summer and fall sweeps. This shows a higher range of variability in sediment loads than in 2013 or 2014. DOT reported the highest unit load for residential type curb and gutter type roads for the summer and fall sweeping periods in 2015, though the data available does not suggest a reason for the higher numbers. CBERRRSA streets tend to have the lightest concentration of sediment

## **Anchorage MS4 Street Sweeping Report for 2015**

on them, producing unit load numbers that are lower than those of ARDSA and ADOT&PF for almost all sweep frequency categories and sweep periods. This may be due to differences in the street patterns of the areas maintained by these two street maintenance groups. The primary residential area served by CBERRRSA lies in a relatively flat, newer subdivision area served by lollipop and looped streets linked by a single collector, with adjacent yards having few trees. As a result fewer intersections are present and the need for winter sanding may be significantly reduced. On the other hand, ARDSA and ADOT&PF serve much older and highly urbanized Anchorage areas where streets are laid out on a grid block basis, requiring many more collectors and a larger number of controlled intersections where more sanding may be needed to maintain safe winter trafficking. These older neighborhoods are also well-treed, which may lead to the higher fall street particulate load observed.

The winter of 2014-15, similar to the previous winter, brought several uncharacteristic mid-winter freeze/thaw cycles that required additional sanding events due to icy road conditions, though how this correlates to the higher than average summer and fall unit load totals for DOT residential roads is unknown. Reported load numbers may be biased high due to inaccurate measurement techniques for determining volume of sediment from typically wet slurries delivered by the street sweepers. Techniques for accurately measuring and reporting sediment loads collected during sweeping operations are being evaluated this winter and adjustments will be made prior to the beginning of the 2016 spring sweep period which will help sweeper operators more accurately measure report their volume and load numbers. Hypothesis for high post sweep dirt loads include overemphasis on full width sweeping, not enough sweeping passes, overwatering when sweeping, road conditions including weathered road surfaces and uneven gutter pans, track out from unpaved areas, and unrestricted parking on streets during sweeping operations. For more information regarding dirt loading and street sweeping performance please see WMS document WMP Apr14001, "Anchorage Street Sweeping and Storm Water Controls: 2013 Performance Evaluation" (Appendix E-2 of the 2013 APDES report). These issues will continue to be addressed in upcoming assessments.



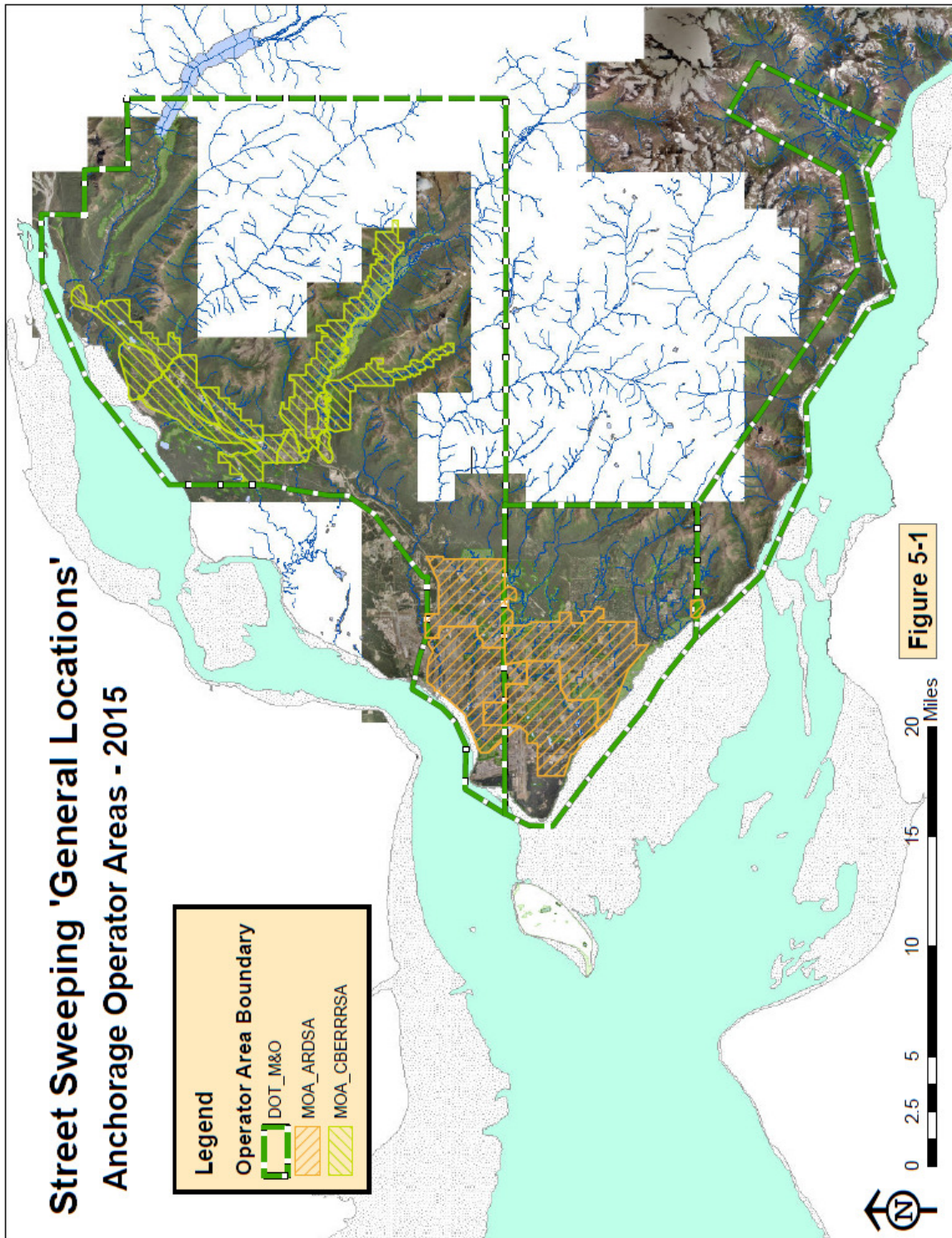
## **5. 2015 Maps and Data Tables**

Section 5 contains maps and detailed data tables supporting summary information and the sweeping assessment presented in Section 2 through 4 above. Section 5.1 contains maps of swept streets and operational areas. Section 5.2 contains detailed sweeping performance records for each of the Anchorage MS4 operators.

### **5.1. *Designated Streets and General Location Maps***

This section contains maps of Anchorage MS4 streets designated for sweeping by each of the principle street maintenance operators listed in Section 2.0. The maps also locate sweeping operational areas ('general locations') that each operator has used to structure compilation and reporting of 2015 sweeping performance records. The first map in this section, Figure 5-1, provides an overview of all operational areas for all operators. More detailed maps of individual operator's areas and designated streets are presented in the following figures.

Figure 5-1 Anchorage MS4 Sweeping 'General Locations' 2015



# Anchorage MS4 Street Sweeping Report for 2015

Figure 5-2 MOA\_ARDSA, Units 3 & 4 (South)—2015 Designated Swept Streets

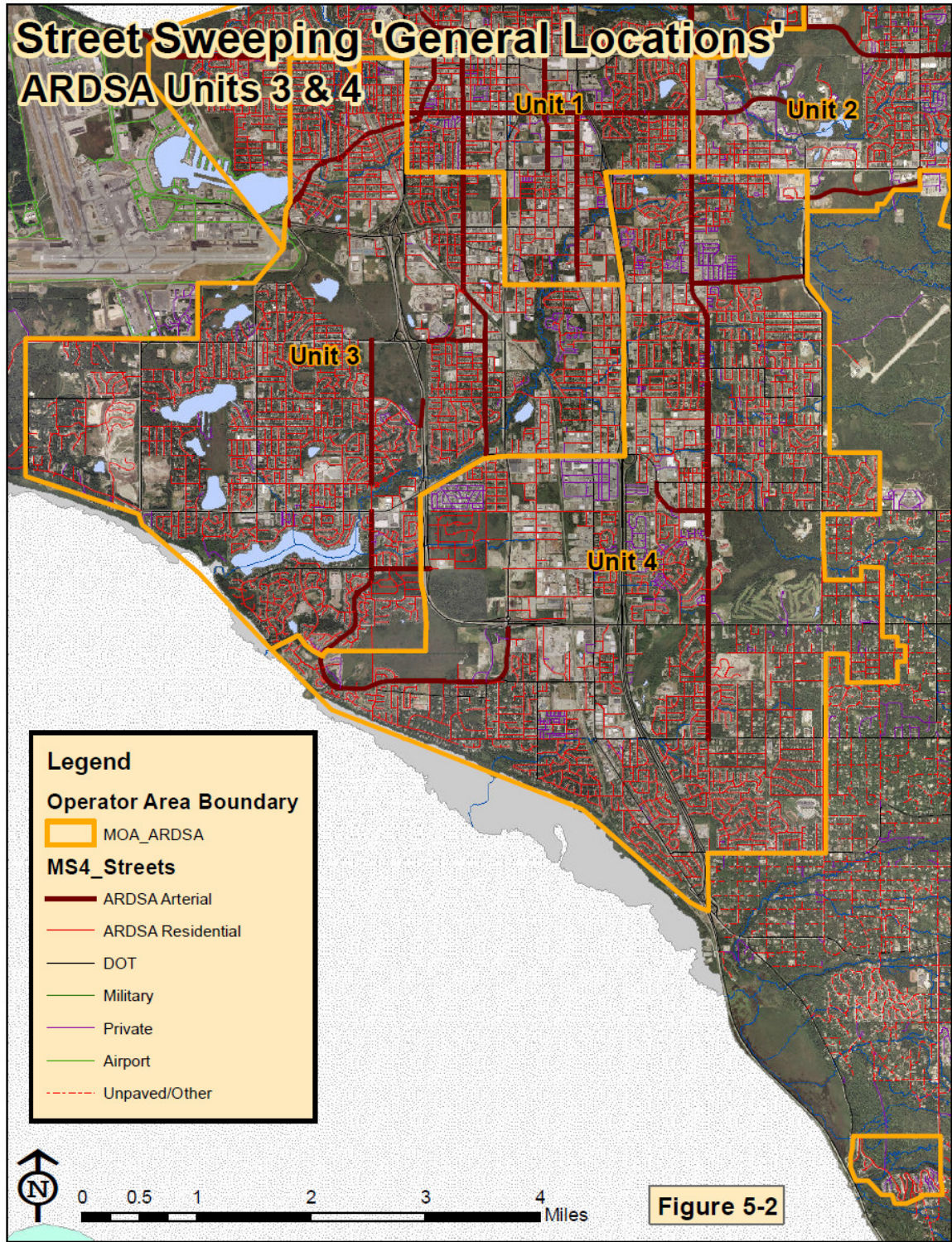


Figure 5-3 MOA\_ARDSA, Units 1 & 2 (North)—2015 Designated Swept Streets

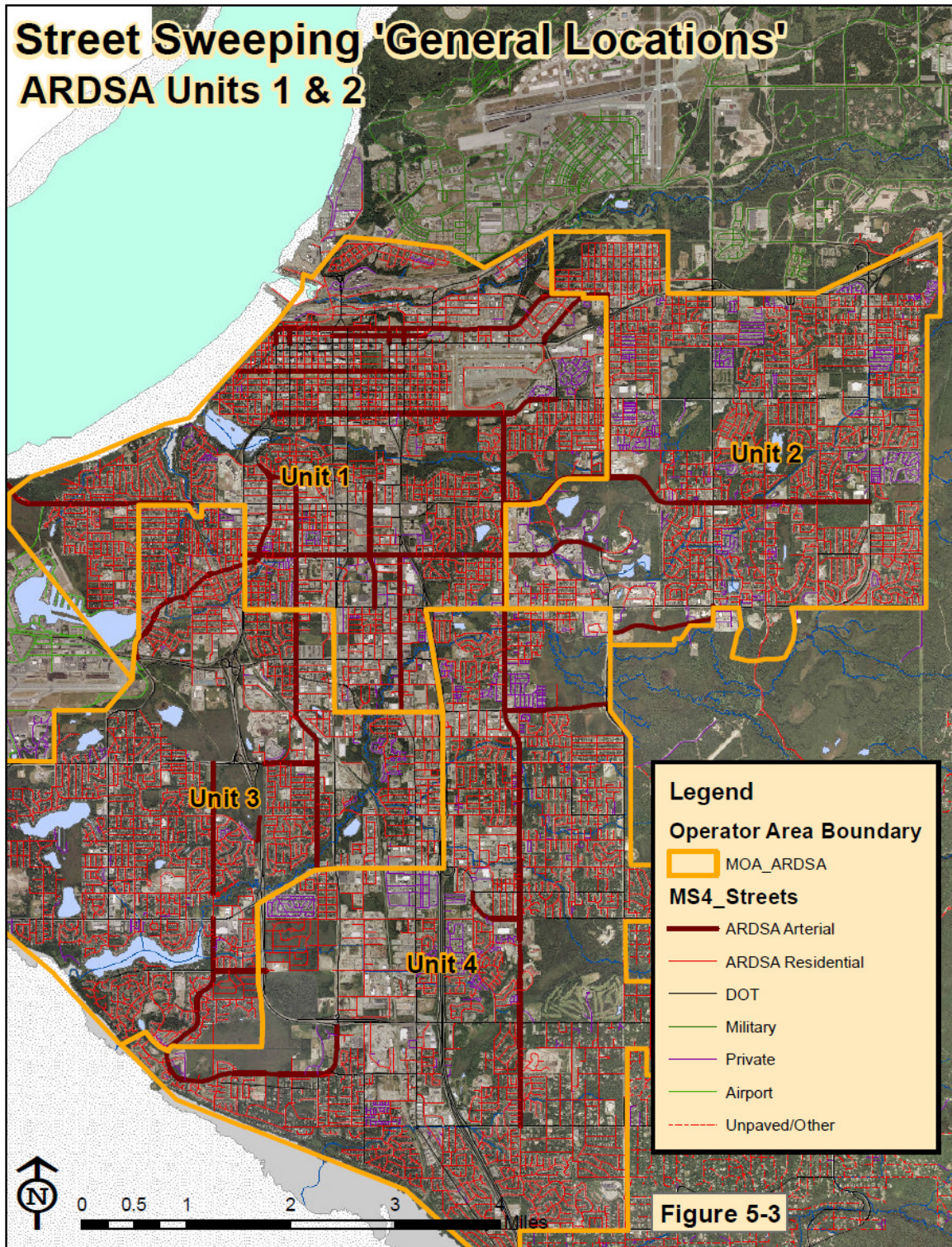
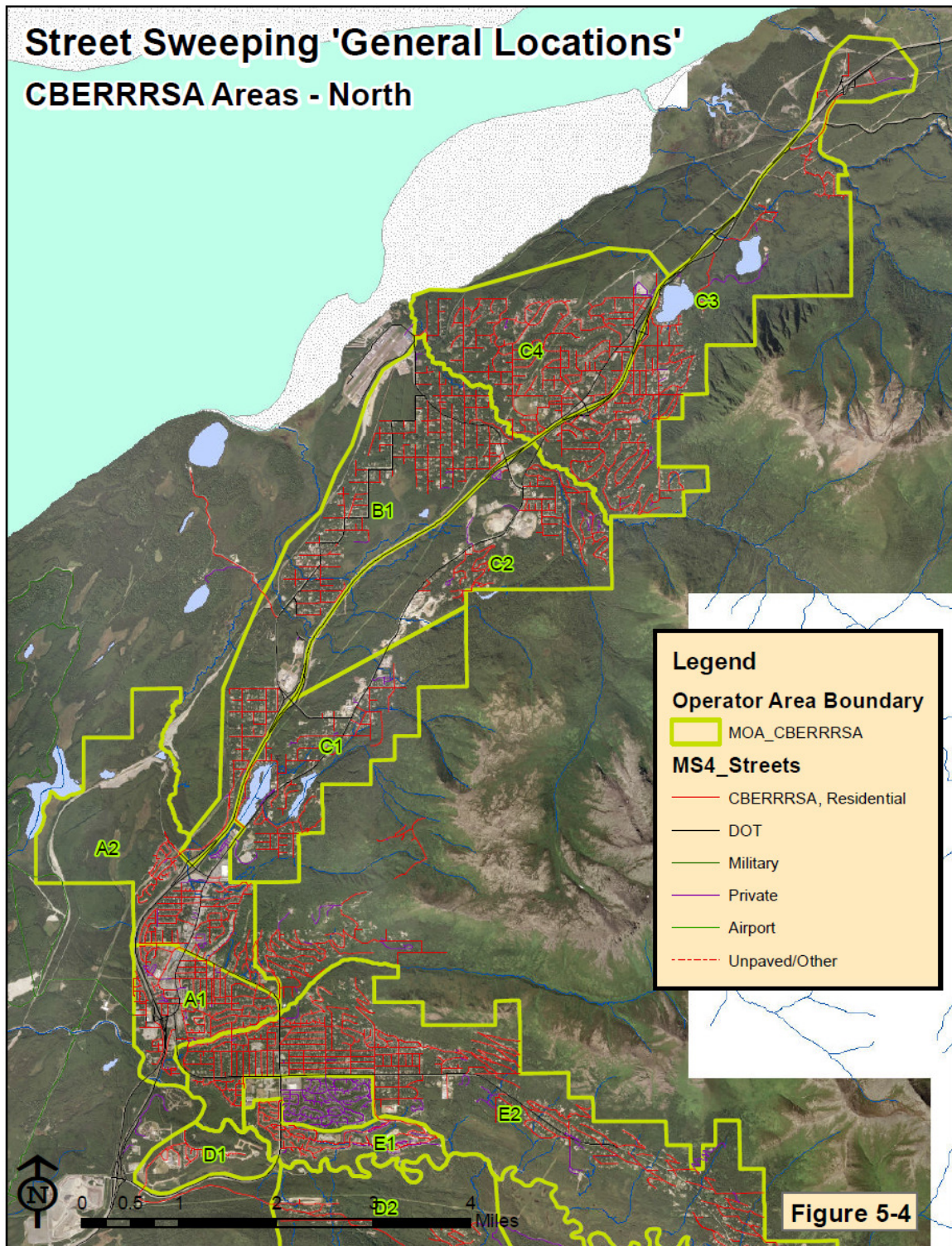
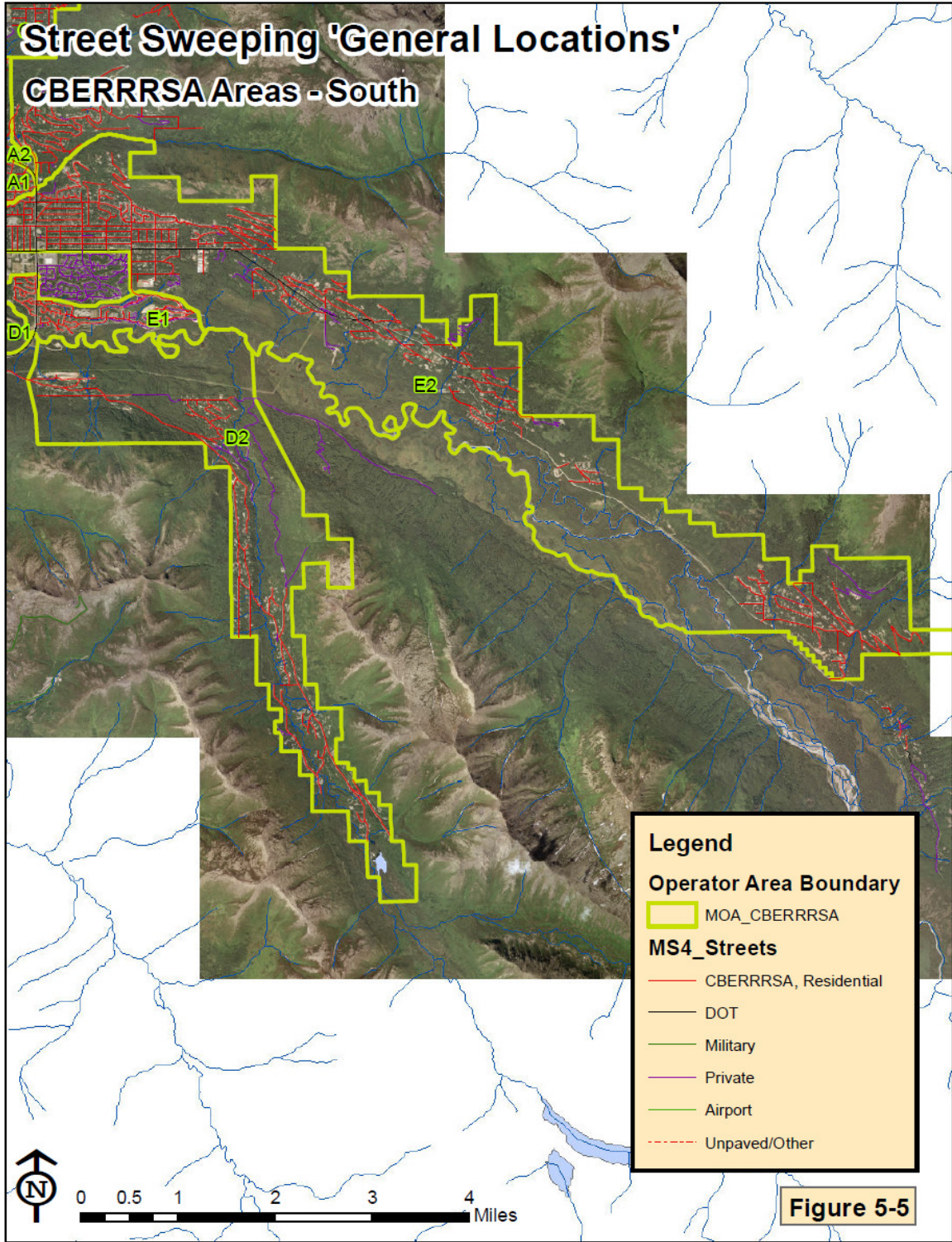


Figure 5-4 CBERRRSA, North—2015 Designated Swept Streets



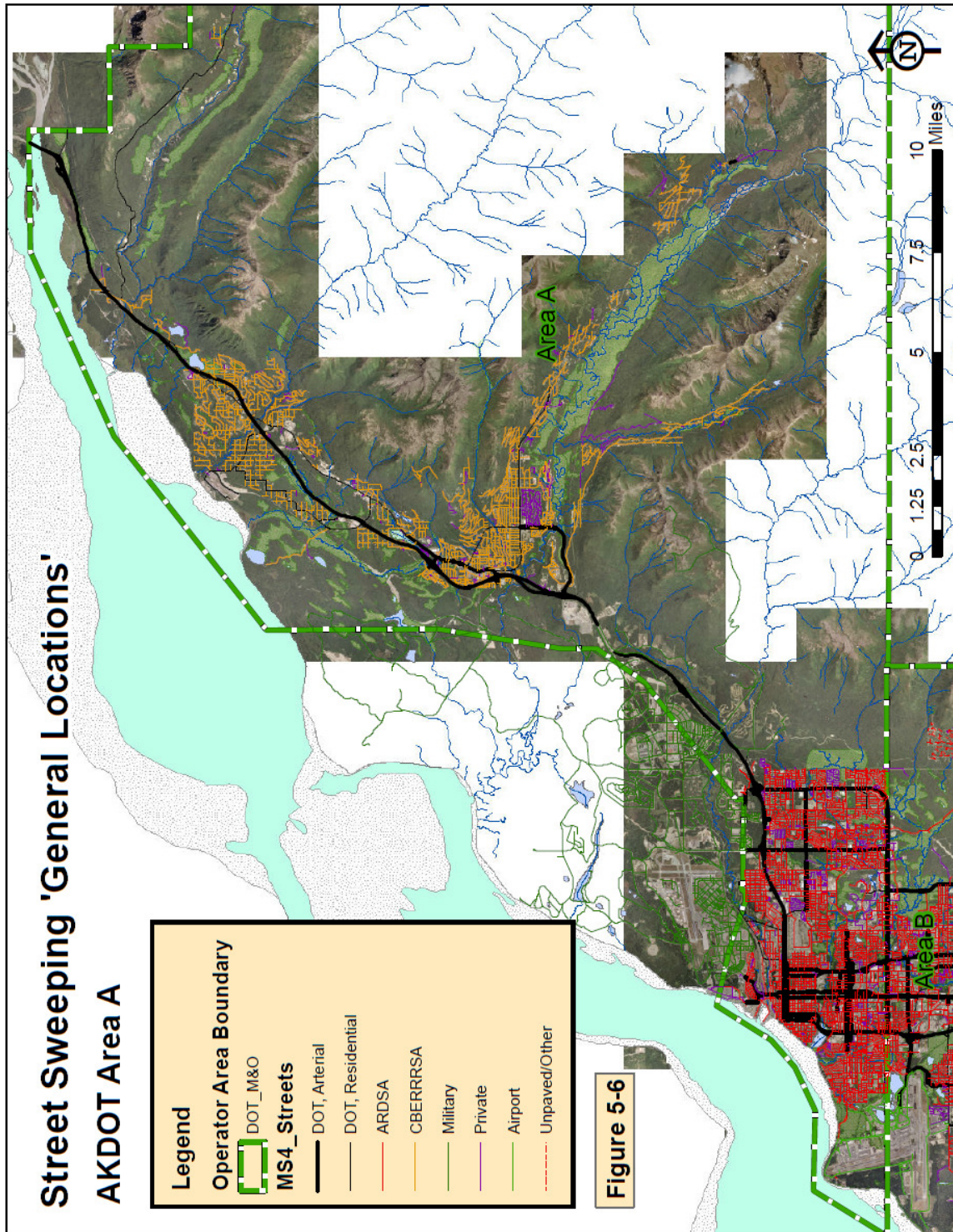
# Anchorage MS4 Street Sweeping Report for 2015

Figure 5-5 CBERRRSA South—2015 Designated Swept Streets



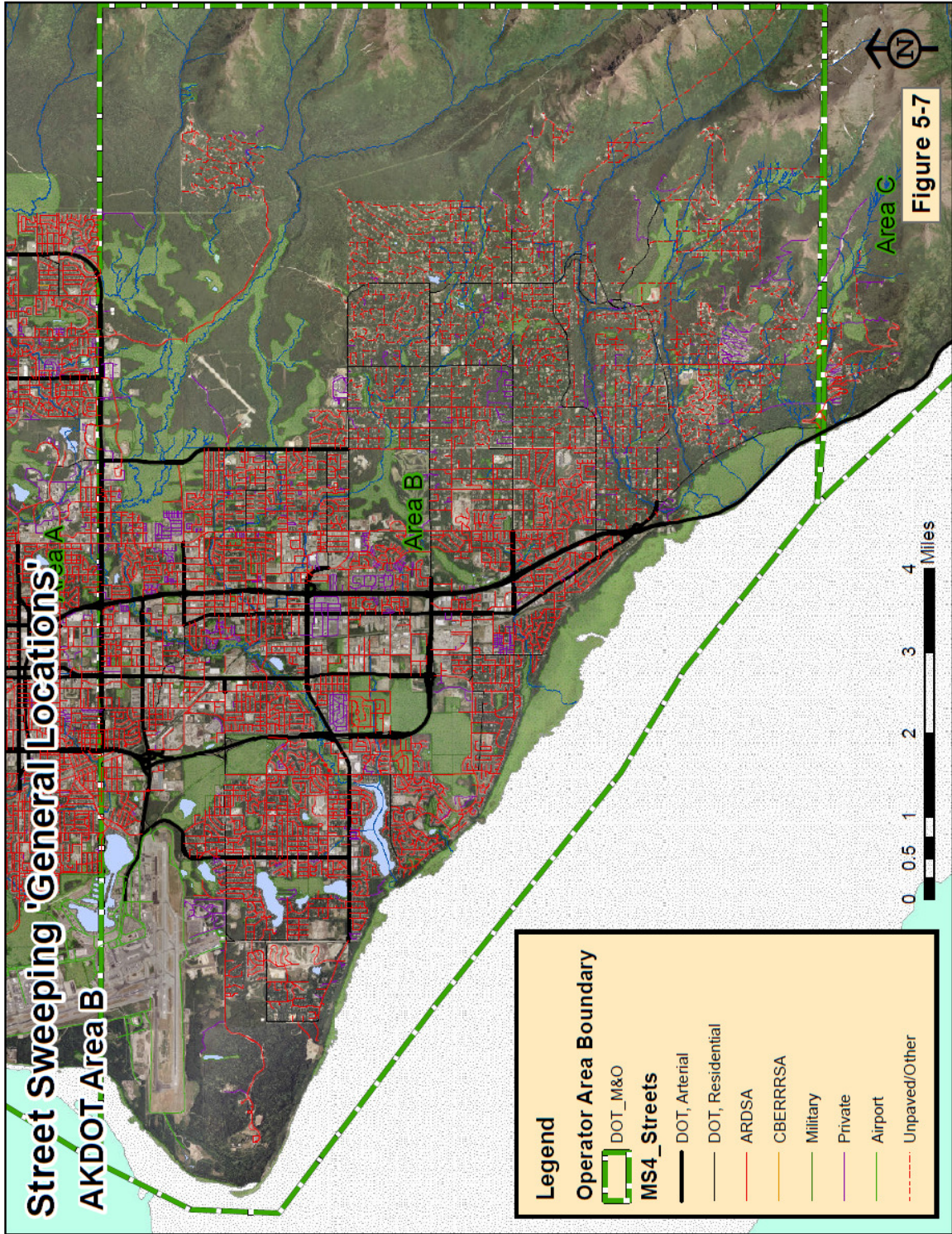
# Anchorage MS4 Street Sweeping Report for 2015

Figure 5-6 ADOT&PF Area A—2015 Designated Swept Streets



# Anchorage MS4 Street Sweeping Report for 2015

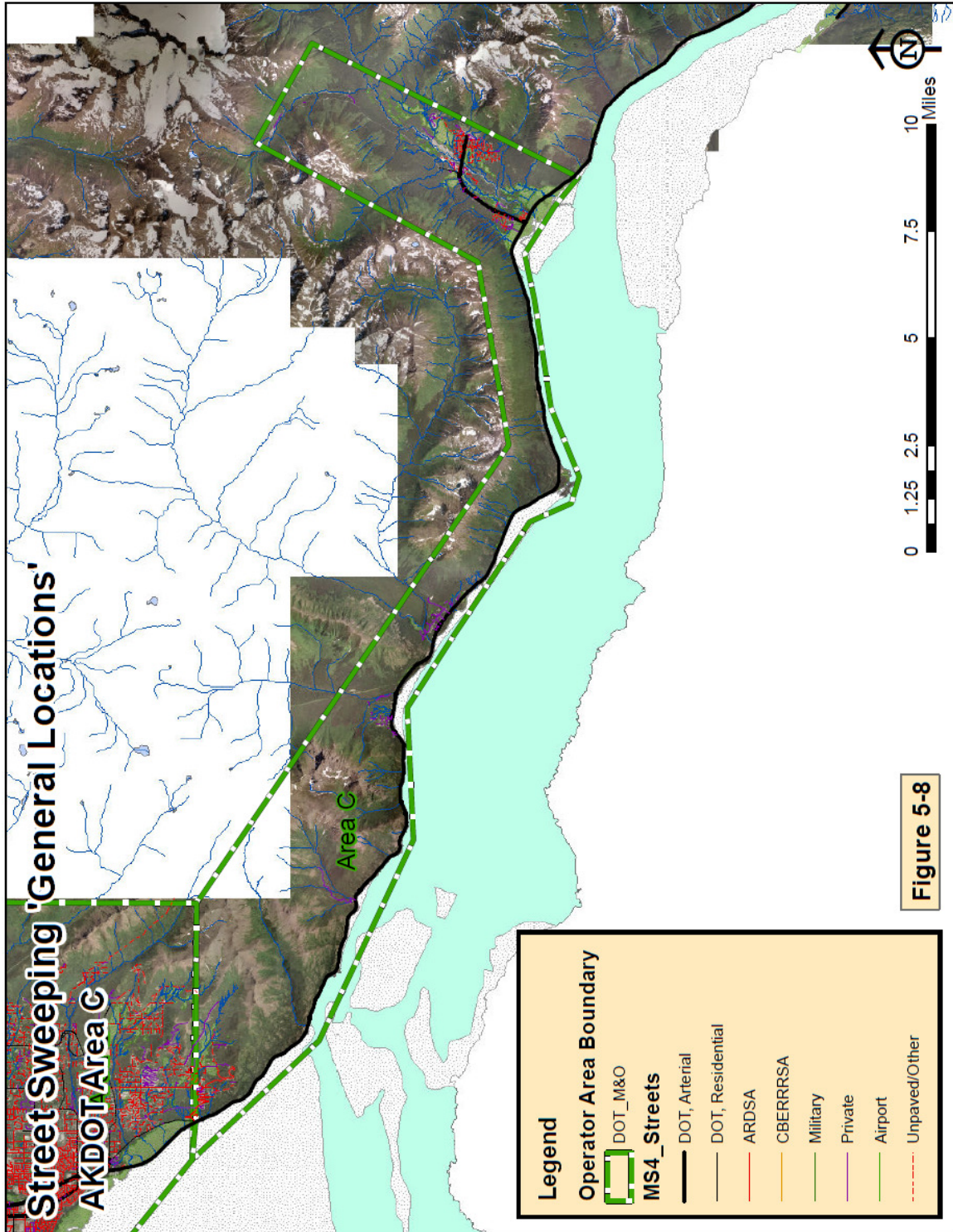
Figure 5-7 ADOT&PF Area B—2015 Designated Swept Streets





# Anchorage MS4 Street Sweeping Report for 2015

Figure 5-8 ADOT&PF Area C—2015 Designated Swept Streets



## **Anchorage MS4 Street Sweeping Report for 2015**

### **5.2. Anchorage MS4 Detailed Sweeping Records for 2015**

Section 5.2 contains detailed sweeping records for 2015 for each of the principle Anchorage MS4 maintenance agencies. Records for each agency are summarized in a separate subsection, with records organized first by sweeping event and then by the operational areas ('general locations') of that operator.

Anchorage MS4 Street Sweeping Report for 2015

5.2.1. ADOT&PF 2015 Detailed Sweeping Reports

Table 5-1 ADOT&PF Spring 2015 Sweeping Report

<b>2015 Spring ADOT&amp;PF</b>							
Completion Range: 4/06/2015 - 6/15/2015							
Area A	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.5	5.0	71	14.3	100%
		CG	29.6	69.1	1731	25.0	100%
		Mixed	17.2	46.4	713	15.4	100%
	Residential	OC	21.3	42.6	383	9.0	100%
		CG	1.1	3.4	52	15.5	100%
		Mixed	11.2	23.0	373	16.2	100%
<b>Totals</b>			83.0	189.5	3323.0		
Area B	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.6	5.3	39	7.4	100%
		CG	10.0	34.7	832	24.0	100%
		Mixed	29.0	74.9	2205	29.4	100%
	Residential	OC	30.3	60.7	193	3.2	100%
		CG	1.9	6.6	114	17.4	100%
		Mixed	17.2	36.0	134	3.7	100%
<b>Totals</b>			91.0	218.1	3517.0		
Area C	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.9	0.0	0	0.0	100%
<b>Totals</b>			2.9	0.0	0		

# Anchorage MS4 Street Sweeping Report for 2015

Table 5-2 ADOT&PF Summer 2015 Sweeping Report

<b>2015 Summer ADOT&amp;PF</b>							
Completion Range: 6/23/2015 - 7/21/2015							
Area A	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.5	5.0	35	7.0	100%
		CG	29.6	69.1	374	5.4	100%
		Mixed	17.2	46.4	145	3.1	100%
	Residential	OC	21.3	42.6	526	12.3	100%
		CG	1.1	3.4	78	23.2	100%
		Mixed	11.2	23.0	299	13.0	100%
<b>Totals</b>			83.0	189.5	1457.0		
Area B	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.6	5.3	11	2.1	100%
		CG	10.0	34.7	189	5.4	100%
		Mixed	29.0	74.9	366	4.9	100%
	Residential	OC	30.3	60.7	130	2.1	100%
		CG	1.9	6.6	39	5.9	100%
		Mixed	17.2	36.0	92	2.6	100%
<b>Totals</b>			91.0	218.1	827.0		
Area C	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial*	OC	2.9	0.0	0	0.0	100%
<b>Totals</b>			2.9	0.0	0		

# Anchorage MS4 Street Sweeping Report for 2015

Table 5-3 ADOT&PF Fall 2015 Sweeping Report

<b>2015 Fall ADOT&amp;PF</b>							
Completion Range: 8/22/2015 - 9/23/2015							
Area A	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.5	5.0	28	5.6	100%
		CG	29.6	69.1	411	5.9	100%
		Mixed	17.2	46.4	197	4.2	100%
	Residential	OC	21.3	42.6	612	14.4	100%
		CG	1.1	3.4	89	26.5	100%
		Mixed	11.2	23.0	353	15.3	100%
<b>Totals</b>			83.0	189.5	1690.0		
Area B	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.6	5.3	10	1.9	100%
		CG	10.0	34.7	272	7.8	100%
		Mixed	29.0	74.9	652	8.7	100%
	Residential	OC	30.3	60.7	91	1.5	100%
		CG	1.9	6.6	46	7.0	100%
		Mixed	17.2	36.0	105	2.9	100%
<b>Totals</b>			91.0	218.1	1176.0		
Area C	EPA Category	Drainage	Street_Miles	Curb/Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (cyds/PU Mile)	Completeness (%)
	Arterial	OC	2.9	0.0	0	0.0	100%
<b>Totals</b>			2.9	0.0	0		

# Anchorage MS4 Street Sweeping Report for 2015

## 5.2.2. CBERRRSA 2015 Detailed Sweeping Reports

Table 5-4 CBERRRSA Spring 2015 Sweeping Report

<b>2015 Spring CBERRRSA</b>							
Completion Range 4/16/2015 - 5/24/2015							
Area A	EPA Category*	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	10.8	20.0	129.0	6.4	100.0
		CG	10.3	20.7	204.0	9.9	100.0
		Mixed	17.0	34.0	60.0	1.8	100.0
<b>Totals</b>			38.1	74.8	393.0		100.0
Area B	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	10.3	7.7	48.0	6.2	100.0
		CG	1.7	3.3	3.0	0.9	100.0
		Mixed	7.6	14.4	27.0	1.9	
<b>Totals</b>			19.6	25.5	78.0		100.0
Area C	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	39.1	42.6	153.0	3.6	100.0
		CG	1.1	2.3	18.0	7.9	100.0
		Mixed	24.5	49.6	51.0	1.0	100.0
<b>Totals</b>			64.7	94.5	222.0		100.0
Area D	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	14.6	12.9	87.0	6.8	100.0
		CG	4.9	9.9	45.0	4.6	100.0
<b>Totals</b>			19.5	22.7	132.0		100.0
Area E	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	40.1	45.0	114.0	2.5	100.0
		CG	15.1	30.1	150.0	5.0	100.0
		Mixed	2.7	5.5	36.0	6.6	100.0
<b>Totals</b>			57.9	80.6	300.0		100.0
Mixed Area	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	na	na	na		100.0
		CG	na	na	na		100.0
		Mixed	na	na	na		100.0
<b>Totals</b>			0.0	0.0	0.0		100.0

\*Note: CBERRRSA Operational area Contains no Arterial Street Segments

# Anchorage MS4 Street Sweeping Report for 2015

Table 5-5 CBERRRSA Summer 2015 Sweeping Report

<b>2015 Summer CBERRRSA</b>							
Completion Range 6/15/2015 - 8/1/2015							
Area A	EPA Category*	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	10.8	20.0	Swept as needed		100.0
		CG	10.3	20.7	Swept as needed		100.0
		Mixed	17.0	34.0	Swept as needed		100.0
<b>Totals</b>			38.1	74.8	*No data reported		100.0
Area B	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	10.3	7.7	Swept as needed		100.0
		CG	1.7	3.3	Swept as needed		100.0
			7.6	14.4	Swept as needed		100.0
<b>Totals</b>			19.6	25.5	*No data reported		100.0
Area C	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	39.1	42.6	Swept as needed		100.0
		CG	1.1	2.3	Swept as needed		100.0
		Mixed	24.5	49.6	Swept as needed		100.0
<b>Totals</b>			64.7	94.5	*No data reported		100.0
Area D	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	14.6	12.9	Swept as needed		100.0
		CG	4.9	9.9	Swept as needed		100.0
<b>Totals</b>			19.5	22.7	*No data reported		100.0
Area E	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	40.1	45.0	Swept as needed		100.0
		CG	15.1	30.1	Swept as needed		100.0
		Mixed	2.7	5.5	Swept as needed		100.0
<b>Totals</b>			57.9	80.6	*No data reported		100.0
Mixed Area	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Residential	OC	na	na	na		100.0
		CG	na	na	na		100.0
		Mixed	na	na	na		100.0
<b>Totals</b>			0.0	0.0	0.0		100.0

\*Note: CBERRRSA Operational area Contains no Arterial Street Segments

\*For the 2015 summer sweep period CBERRRSA reported that roads were swept 'as needed' (as per the Street Sweeping Management Plan) and did not report any volumes of swept materials. This suggests that only open channel type roads swept with kick broom type sweepers were swept in the summer period.

# Anchorage MS4 Street Sweeping Report for 2015

Table 5-6 CBERRRSA Fall 2015 Sweeping Report

<b>2015 Fall CBERRRSA</b>							
Completion Range 9/4/2015 - 9/23/2015							
<b>Area A</b>	<b>EPA Category*</b>	<b>Drainage</b>	<b>Street Miles</b>	<b>Pickup Miles</b>	<b>Total Pick up (Cubic Yards)</b>	<b>Unit Pick up (Cubic Yds /Mile)</b>	<b>Completeness (%)</b>
	Residential	OC	2.0	2.4	3.0	1.2	100.0
		CG	1.0	2.0	12.0	5.9	100.0
		Mixed	11.8	23.5	9.0	0.4	100.0
<b>Totals</b>			14.8	28.0	24.0		100.0
<b>Area B</b>	<b>EPA Category</b>	<b>Drainage</b>	<b>Street Miles</b>	<b>Pickup Miles</b>	<b>Total Pick up (Cubic Yards)</b>	<b>Unit Pick up (Cubic Yds /Mile)</b>	<b>Completeness (%)</b>
	Residential	OC	4.5	*See Mixed	*See Mixed		100.0
		CG	*See Mixed	*See Mixed	*See Mixed		100.0
	<b>Totals</b>			4.5	0.0	0.0	
<b>Area C</b>	<b>EPA Category</b>	<b>Drainage</b>	<b>Street Miles</b>	<b>Pickup Miles</b>	<b>Total Pick up (Cubic Yards)</b>	<b>Unit Pick up (Cubic Yds /Mile)</b>	<b>Completeness (%)</b>
	Residential	OC	12.2	*See Mixed	*See Mixed		100.0
		CG	*See Mixed	*See Mixed	*See Mixed		
		Mixed	10.3	20.6	6.0	0.3	100.0
<b>Totals</b>			22.5	20.6	6.0		100.0
<b>Area D</b>	<b>EPA Category</b>	<b>Drainage</b>	<b>Street Miles</b>	<b>Pickup Miles</b>	<b>Total Pick up (Cubic Yards)</b>	<b>Unit Pick up (Cubic Yds /Mile)</b>	<b>Completeness (%)</b>
	Residential	OC	7.1	*See Mixed	*See Mixed		100.0
		CG	*See Mixed	*See Mixed	*See Mixed		100.0
		Mixed	10.9	21.7	3.0	0.1	
<b>Totals</b>			17.9	21.7	3.0		100.0
<b>Area E</b>	<b>EPA Category</b>	<b>Drainage</b>	<b>Street Miles</b>	<b>Pickup Miles</b>	<b>Total Pick up (Cubic Yards)</b>	<b>Unit Pick up (Cubic Yds /Mile)</b>	<b>Completeness (%)</b>
	Residential	OC	11.9	*See Mixed	*See Mixed		100.0
		CG	4.0	8.1	12.0	1.5	100.0
		Mixed	7.5	15.0	3.0	0.2	100.0
<b>Totals</b>			23.5	23.1	15.0		100.0
<b>Mixed Area</b>	<b>EPA Category</b>	<b>Drainage</b>	<b>Street Miles</b>	<b>Pickup Miles</b>	<b>Total Pick up (Cubic Yards)</b>	<b>Unit Pick up (Cubic Yds /Mile)</b>	<b>Completeness (%)</b>
	Residential	OC	10.2	20.4	3.0	0.1	100.0
		CG	0.0	0.0	0.0		
		Mixed	105.6	211.7	42.0	0.2	100.0
<b>Totals</b>			115.8	232.2	45.0		100.0

\*Note: CBERRRSA Operational area Contains no Arterial Street Segments



# Anchorage MS4 Street Sweeping Report for 2015

## 5.2.3. ARDSA 2015 Detailed Sweeping Reports

Table 5-7 ARDSA Spring 2015 Sweeping Report

<b>2015 Spring ARDSA</b>							
Completion Range 4/13/2015 - 6/1/2015							
Unit 1	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	23.6	47.2	291.1	6.2	100.0
	Residential	Mixed	143.3	286.6	3379.5	11.8	100.0
<b>Totals</b>			166.9	333.8	3670.5	11.0	100.0
Unit 2	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	6.2	12.4	128.0	10.3	100.0
	Residential	Mixed	130.0	260.0	2211.0	8.5	100.0
<b>Totals</b>			136.2	272.4	2339.0	8.6	100.0
Unit 3	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	8.0	16.1	913.1	56.8	100.0
	Residential	Mixed	149.5	299.0	2079.2	7.0	100.0
<b>Totals</b>			157.5	315.0	2992.3	9.5	100.0
Unit 4	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	8.0	15.9	639.2	40.2	100.0
	Residential	Mixed	157.9	315.7	2208.3	7.0	100.0
<b>Totals</b>			165.8	331.6	2847.5	8.6	100.0

\*Note: For all 2015 and future sweep periods, ARDSA has changed their reporting ‘general areas’ from 60 ‘Sectors’ to 4 ‘Units’. The change was made to increase the ease and accuracy of swept load quantities reported by sweeper operators. The areas encompassed in the ARDSA Units can be seen in Figures 5-1 through 5-3.

# Anchorage MS4 Street Sweeping Report for 2015

Table 5-8 ARDSA Summer 2015 Sweeping Report

<b>2015 Summer ARDSA</b>							
Completion Range 6/15/2015 - 8/1/2015							
Unit 1	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	23.6	47.2	86.8	1.8	100.0
	Residential	Mixed	143.3	286.6	104.3	0.4	100.0
<b>Totals</b>			166.9	333.8	191.0	0.6	100.0
Unit 2	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	6.2	12.4	11.3	0.9	100.0
	Residential	Mixed	130.0	260.0	36.0	0.1	100.0
<b>Totals</b>			136.2	272.4	47.3	0.2	100.0
Unit 3	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	8.0	16.1	79.0	4.9	100.0
	Residential	Mixed	149.5	299.0	16.0	0.1	100.0
<b>Totals</b>			157.5	315.0	95.0	0.3	100.0
Unit 4	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	8.0	15.9	53.0	3.3	100.0
	Residential	Mixed	157.9	315.7	23.5	0.1	100.0
<b>Totals</b>			165.8	331.6	76.5	0.2	100.0

\*Note: For all 2015 and future sweep periods, ARDSA has changed their reporting 'general areas' from 60 'Sectors' to 4 'Units'. The change was made to increase the ease and accuracy of swept load quantities reported by sweeper operators. The areas encompassed in the ARDSA Units can be seen in Figures 5-1 through 5-3.

# Anchorage MS4 Street Sweeping Report for 2015

Table 5-9 ARDSA Fall 2015 Sweeping Report

<b>2015 Fall ARDSA</b>							
Completion Range 9/1/2015 - 10/15/2015							
Unit 1	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	23.6	47.2	0.0	0.0	0.0
	Residential	Mixed	143.3	286.6	1111.0	3.9	100.0
<b>Totals</b>			166.9	333.8	1111.0	3.3	
Unit 2	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	6.2	12.4	0.0	0.0	0.0
	Residential	Mixed	130.0	260.0	420.0	1.6	100.0
<b>Totals</b>			136.2	272.4	420.0	1.5	
Unit 3	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	8.0	16.1	89.8	5.6	100.0
	Residential	Mixed	149.5	299.0	580.8	1.9	100.0
<b>Totals</b>			157.5	315.0	670.5	2.1	100.0
Unit 4	EPA Category	Drainage	Street Miles	Pickup Miles	Total Pick up (Cubic Yards)	Unit Pick up (Cubic Yds /Mile)	Completeness (%)
	Arterial	Mixed	8.0	15.9	29.0	1.8	100.0
	Residential	Mixed	157.9	315.7	397.8	1.3	100.0
<b>Totals</b>			165.8	331.6	426.8	1.3	100.0

\*Note: For all 2015 and future sweep periods, ARDSA has changed their reporting ‘general areas’ from 60 ‘Sectors’ to 4 ‘Units’. The change was made to increase the ease and accuracy of swept load quantities reported by sweeper operators. The areas encompassed in the ARDSA Units can be seen in Figures 5-1 through 5-3.

# Anchorage MS4 Street Sweeping Report for 2015

## 5.2.4. ASD 2015 Detailed Sweeping Reports

Table 5-10 ASD 2015 Sweeping Report

<b>ASD Parking Lot Sweep Summary 2015</b>				
			<b>2015 Sweeps</b>	
<b>ASD SiteCode</b>	<b>Site</b>	<b>Area (sqft)</b>		<b>Swept Total Qty (cyds)</b>
335	Ravenwood Elementary School	89,075		21
220	Girdwood K-8 School	89,969		20
270	Muldoon Elementary School	92,049		14
380	Turnagain Elementary School	93,900		14
364	Susitna Elementary School	94,200		13
260	Mountain View Elementary School	95,101		6
237	Huffman Elementary School	95,228		20
340	Rogers Park Elementary School	96,305		13
450	Polaris K-12 School	97,293		11
410	Wonder Park Elementary School	97,567		10
390	Williwaw Elementary School	97,956		8
320	O'Malley Elementary School	98,189		16
118	Bear Valley Elementary School	98,474		20
330	Rabbit Creek Elementary School	99,865		20
112	Alpenglow Elementary School	102,825		23
363	Trailside Elementary School	103,834		25
130	Campbell Elementary School	104,000		7
418	Gladys Wood Elementary School	104,344		16
125	Bowman Elementary School	106,000		17
362	Spring Hill Elementary School	106,000		24
250	Lake Otis Elementary School	106,173		15
280	North Star Elementary School	106,780		16
116	Bayshore Elementary School	106,792		11
290	Northern Lights ABC School	108,974		18
248	Lake Hood Elementary School	114,600		15
300	Northwood ABC Elementary School	118,491		18
120	Birchwood ABC Elementary School	119,236		22
242	Kasuun Elementary School	119,441		21
384	Tyson Elementary School	120,690		15
400	Willow Crest Elementary School	124,285		17
345	Russian Jack Elementary School	128,685		12
170	Chugiak Elementary School	140,875		22
760, 850	West High/ Romig Middle School	176,826		85

# Anchorage MS4 Street Sweeping Report for 2015

<b>ASD Parking Lot Sweep Summary 2015</b>				
			<b>2015 Sweeps</b>	
<b>ASD SiteCode</b>	<b>Site</b>	<b>Area (sqft)</b>		<b>Swept Total Qty (cyds)</b>
700, 160	Central Middle/ Chugach Elementary	116,792		17
805	King Career Center	144,663		13
730	Gruening Middle School	150,000		35
246	Kincaid Elementary School	152,789		19
750	Mears Middle School	156,806		21
710	Clark Middle School	168,224		19
740	Hanshew Middle School	169,175		29
785	Begich Middle School	177,442		14
770	Wendler Middle School	193,293		21
780	Goldenview Middle School	201,993		34
755	Mirror Lake Middle School	203,260		22
865	Eagle River High School	275,595		38
810	Chugiak High School	325,000		37
860	South High School	340,669		45
800	Bartlett High School	412,961		32
830	East High School	459,000		48
840	Service High School	473,795		60
820, 150	Dimond High/ Chinook Elementary	580,883		59
	<b>Total</b>	<b>8,256,362</b>		<b>1168</b>
	Unit Pick Up (cyds/acre)			<b>6.2</b>









## **Anchorage MS4 Street Sweeping Report for 2015**

ARDSA and AKDOT reported no changes to their lists of swept streets for the 2015 sweeping periods.