

Street Sweeping Manual

Detailed Manual Outline

July 2024

Table of Contents

Table of Contents	i
Chapter 1. MANUAL INTRODUCTION	1
1.1 Introduction	1
1.2 Manual Background and Purpose	1
1.3 MS4 Permit Requirements.....	1
1.4 Manual Organization	1
Chapter 2. STREET SWEEPING BENEFITS.....	2
2.1 Chapter Introduction	2
2.2 Literature Synthesis	2
2.2.1 Sources of Street Waste	2
2.2.2 Physiochemical Characteristics	2
2.2.3 Removal Efficiency.....	2
2.2.4 Street Pollutant Transport	2
2.2.5 Water Quality Benefits.....	2
2.3 Co-Benefits	2
Chapter 3. IDENTIFYING PRIORITY STREET SWEEPING AREAS.....	5
3.1 Chapter Introduction	5
3.2 Literature Synthesis	5
3.3 Applicable Permit Requirements	5
3.4 Identifying and Selecting Priority Street Sweeping Areas	5
3.4.1 Using Collected Data to Identify Priority Street Sweeping Areas.....	5
3.4.2 Using Literature Findings to Identify Priority Street Sweeping Areas	5
3.5 Other Jurisdictional Priority Areas for Street Sweeping	5
Chapter 4. ESTABLISHING STREET SWEEPING PROGRAMS.....	7
4.1 Chapter Introduction	7
4.2 Street Sweeping Overview.....	7
4.3 Program Elements	7
4.3.1 Administration.....	7
4.3.2 Staffing.....	7
4.3.3 Scheduling	7
4.3.4 Operations and Maintenance.....	7



4.3.5	Street Waste Disposal	7
4.3.6	Documentation & Reporting	7
4.3.7	Training.....	7
4.4	Program Sizing	7
4.5	Program Organization	8
4.6	Street Sweeping Equipment	8
4.6.1	Equipment Selection	8
4.6.2	Equipment Maintenance.....	8
4.6.3	Equipment Replacement.....	8
4.7	Contracting vs. In-House Street Sweeping	8
4.8	Other Program Considerations.....	8
4.8.1	Sweeping Nonstandard Curb Lines.....	8
4.8.2	Wet Weather Practices.....	8
4.8.3	Tree Impacts	8
4.8.4	Parking Restrictions and Enforcement	8
4.8.5	Interlocal Agreements and Partnerships.....	9
Chapter 5.	OPTIMIZING STREET SWEEPING PRACTICES	11
5.1	Chapter Introduction	11
5.2	Literature Synthesis: Variables that Impact Sweeping Efficiency and Efficacy	11
5.3	Performance Measures for Street Sweeping Activities	11
5.4	Improving Efficiency and Efficacy of Street Sweeping Practices.....	11
5.5	Designing Street Sweeping Routes	11
5.5.1	Considerations when Designing Street Sweeping Routes.....	11
5.5.2	Grids	11
5.5.3	Areas.....	11
5.6	Addressing Common Street Sweeping Challenges	11
Chapter 6.	DOCUMENTING, TRACKING, AND COLLECTING DATA FOR STREET SWEEPING ACTIVITIES ..	13
6.1	Chapter Introduction	13
6.2	Data Collection	13
6.2.1	Data to be Collected.....	13
6.2.2	Supplementing Missing Data.....	13
6.3	Tracking.....	13
6.3.1	Information to Track.....	13



6.3.2	Manual Tracking Methods.....	13
6.3.3	Automated Tracking Methods.....	13
6.4	Documentation and Reporting	13
6.4.1	Permit Documentation and Reporting Requirements.....	13
6.4.2	Additional Documentation	14
Chapter 7.	DISPOSING OF STREET SWEEPING WASTE	15
7.1	Chapter Introduction	15
7.2	Applicable Permit Requirements.....	15
7.3	Street Sweeping Waste Treatment and Disposal.....	15
7.3.1	Wastewater Treatment and Disposal	15
7.3.2	Solids Disposal.....	15
7.4	Estimating Generated Waste and Decant Facility Size.....	15
7.4.1	Estimating Generated Waste.....	15
7.4.2	Decant Facility Sizing	15
7.5	Planning, Designing, and Operating Decant Facilities	15
7.5.1	Decant Facility Planning	16
7.5.2	Decant Facility Design	16
7.5.3	Decant Facility Operations and Maintenance	16
Chapter 8.	STREET SWEEPING COST CONSIDERATIONS.....	17
8.1	Chapter Introduction	17
8.2	Street Sweeping Staff and Resources	17
8.2.1	Workforce Development Program	17
8.3	Lifecycle Cost Estimating.....	17
8.4	Funding	17
8.5	Contracting vs. In-House Street Sweeping	17
Chapter 9.	OTHER CONSIDERATIONS	19
9.1	Chapter Introduction	19
9.2	Emerging Contaminants	19
9.3	Impacts of Sand and Deicers	19





Chapter 1. MANUAL INTRODUCTION

Purpose: Describe the manual’s intended use and audience, relevant permit requirements, background on why the manual was developed, and an overview of the manual organization and content.

1.1 Introduction

Introduces manual content and background.

1.2 Manual Background and Purpose

Explains manual purpose, background, intended audience, and how the manual can be used.

1.3 MS4 Permit Requirements

Describes 2024–2029 MS4 Stormwater Permit requirements regarding street sweeping, including Appendix 6 – Street Waste Disposal; compares Phase I, Phase II Eastern Washington, and Phase II Western Washington requirements.

1.4 Manual Organization

Lists the manual chapters and a brief description of their content, including appendices.

Figures

- Figure of a street sweeper

Tables

- Table comparing the Phase I, Phase II Eastern Washington, and Phase II Western Washington street sweeping requirements

Appendices

- None

Sources

- *Synthesis of Street Sweeping Research & Practices Guiding Program Development & Implementation*, Stormwater Action Monitoring Round 4 Proposal
- *State of Practice: Assessing Water Quality Benefits from Street Sweeping* by Hixon & Dymond (2018)
- O&M Ad Hoc Committee White Paper by Trohimovich, et al. (2022)
- Structural Stormwater Controls (SSC) Science Synthesis Project Presentation by Ecology (2019)
- Street Sweeping Technical Sub-group Scope (2022)
- *City of Ellensburg Street Sweeping vs Catch Basin Cleaning Effectiveness Studies Technical Evaluation Report (TER)* by Navickis-Brasch, et. al. (2020)



Chapter 2. STREET SWEEPING BENEFITS

Purpose: Summarize the impacts that street waste can have on water quality and the benefits street sweeping can provide to reduce those impacts. This chapter will also describe additional benefits of street sweeping, such as benefits to public health and safety.

2.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

2.2 Literature Synthesis

Summarizes the compilation of research findings regarding characteristics of street waste and the impacts of street sweeping on water quality and public health.

2.2.1 Sources of Street Waste

Lists sources of street waste.

2.2.2 Physiochemical Characteristics

Describes the physical and chemical properties of street waste, including chemical composition, pollutant loads, and particle size distribution. This section will also describe how street waste characteristics differ based on factors such as road classifications, AADT levels, land use types, areas with significant tire wear, geographical area, and season.

2.2.3 Removal Efficiency

Summarizes the results of studies evaluating street waste removal quantities and what is known and/or unknown about the impacts of street sweeping on pollutant concentrations in receiving waters. This will include a description of variables known to influence efficiency.

2.2.4 Street Pollutant Transport

Summarizes the fate and transport of street pollutants: how they get to the street surface and move through the stormwater system, and their storage components. This will include a pathway diagram.

2.2.5 Water Quality Benefits

Concludes the literature synthesis section by summarizing the water quality benefits described in available literature.

2.3 Co-Benefits

Describes other benefits of street sweeping, including benefits to air quality, public health and safety, and jurisdiction aesthetics.

Figures

- Pathway diagram
- Before and after street sweeping photos to highlight co-benefits, such as aesthetics



Tables

- Table summarizing chemical composition and particle size of different pollutants on pollutant-generating impervious surfaces where sweepers are used
- Tables summarizing differences of street waste characteristics based on factors such as road classifications, AADT levels, land use types, areas with significant tire wear, geographical area, and season
- Table summarizing pollutant-removal rates associated with street sweeping as reported in sources

Appendices

- None

Sources

- *A review on the effectiveness of street sweeping, washing, and dust suppressants as urban PM control methods* by Amato, et al. (2010)
- *Occurrences of Tire Rubber-Derived Contaminants in Cold-Climate Urban Runoff* by Challis, et al. (2021)
- *PSP Discussion Effectiveness of Street Sweeping* by Basketfield (2019)
- Puget Sound Habitat, Shellfish, and Stormwater Strategic Initiative leads by EPA (2022)
- *Effectiveness of Basin-Wide Stormwater Best Management Practices Thea Foss Drainage Basin, City of Tacoma* by Anchor QEA LLC, et al. (2012)
- *Pollutant Loading to Stormwater Runoff from Highways: Impact of a Highway Sweeping Program* by Horwath & Bannerman (2009)
- *Evaluation of Street Sweeping as a Stormwater Quality-Management Tool in Three Residential Basins in Madison, Wisconsin* by Selbig & Bannerman (2007)
- *Water Quality Assessment and Monitoring Study: Estimated Present-Day Contaminant Loadings to Duwamish Estuary/Elliott Bay and Lake Union/Ship Canal* by Wright, et al. (2017)
- *Eastern Washington Stormwater Effectiveness Studies Technical Evaluation Report (TER)* by Osborn Consulting, Inc. (2020)
- *Residential Street-Dirt Accumulation Rates and Chemical Composition, and Removal Efficiencies by Mechanical- and Vacuum-Type Sweepers, New Bedford, Massachusetts, 2003–04* by Breault, et al. (2005)
- *Effectiveness of Street Sweeping in Incline Village, NV* by Brown, et al. (2011)
- *Removal of road deposited sediments by sweeping and its contribution to highway runoff quality in Korea* by Jeong & Ko (2014)
- *Eastern WA Stormwater Effectiveness Studies QAPP for City of Ellensburg* by HDR, Inc. (2018)
- *Literature Review – Research in Support of an Interim Pollutant Removal Rate for Street Sweeping and Storm Drain Cleanout Activities* by DiBlasi, et al. (2006)
- *City of Seattle NPDES Phase I Municipal Stormwater Permit – Street Sweeping Water Quality Effectiveness Study Final Report* by Seattle Public Utilities (2018)



- *Street Sweeping as a Method of Source Control for Urban Stormwater Pollution* by Rochfort, et al. (2009)
- *State of Practice: Assessing Water Quality Benefits from Street Sweeping* by Hixon & Dymond (2018)
- *Heavy metals transport pathways: The importance of atmospheric pollution contributing to stormwater pollution* by Liu, et al. (2018)
- *Thea Foss and Wheeler-Osgood Waterways 2014 Source Control and Water Year 2014 Stormwater Monitoring Report* by City of Tacoma, etc. (2015)
- *Transferal of HMs pollution from road-deposited sediments to stormwater runoff during transport processes* by Wang, et al. (2019)
- *Street Sweeping Water Quality Effectiveness Study* by City of Seattle (2016)
- *Street Sweeping* by Nilsen (2022)
 - Sweeping Effectiveness; observations on tire wear particles and 6-PPD; semi-educated guess at sweeping effectiveness & 6-PPDQ
- *Effectiveness of Street Sweeping: Interpreting Regional Results* by Trujilo, et al. (2021)
- *Quantifying the Impact of Catch Basin and Street Sweeping on Storm Water Quality for a Great Lakes Tributary: A Pilot Study* by Tetra Tech (2001)



Chapter 3. IDENTIFYING PRIORITY STREET SWEEPING AREAS

Purpose: Provide guidance to assist Permittees in identifying their specific priority areas for their street sweeping program using information from Chapter 2 and available jurisdictional information.

3.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

3.2 Literature Synthesis

Summarizes the compilation of research findings related to prioritizing locations for street sweeping.

3.3 Applicable Permit Requirements

Summarizes priority areas defined by the MS4 Permits.

3.4 Identifying and Selecting Priority Street Sweeping Areas

Introduces general approaches to selecting priority areas.

3.4.1 Using Collected Data to Identify Priority Street Sweeping Areas

Explains how to use data collected by the jurisdiction, described in Chapter 6, to prioritize areas for street sweeping.

3.4.2 Using Literature Findings to Identify Priority Street Sweeping Areas

Explains how to use findings from the literature synthesis, described in Section 3.1, to prioritize areas for street sweeping.

3.5 Other Jurisdictional Priority Areas for Street Sweeping

Describes other areas jurisdictions may consider prioritizing for street sweeping, such as roads that serve commercial or industrial land use, areas with significant construction activity, areas with significant tree canopy with leaf litter drop, publicly owned parking areas, near shore areas, areas with TMDLs, and areas with receiving waters with protected habitats.

Figures

- Example priority roadway types/conditions

Tables

- Table summarizing applicable MS4 Permit requirements related to identifying priority street sweeping areas

Appendices

- None



Sources

- *Structural Stormwater Controls Science Review & Synthesis Project* by Navickis-Brasch, et al. (2021)
- *Sediment load estimation in combined sewer systems located in semi-arid areas: a case study* by Trapote & Egea (2016)
- *Quantifying the Impact of Catch Basin and Street Sweeping on Storm Water Quality for a Great Lakes Tributary: A Pilot Study* by Tetra Tech (2001)
- *City of Ellensburg Street Sweeping vs Catch Basin Cleaning Effectiveness Studies Technical Evaluation Report (TER)* by Navickis-Brasch, et. al. (2020)
- *Metals and PAHs Absorbed to Street Particles* by Sim-Lin Lau and Michael K. Stenstrom (2005)



Chapter 4. ESTABLISHING STREET SWEEPING PROGRAMS

Purpose: Provide guidance for starting new street sweeping programs, including guidance for defining program goals.

4.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

4.2 Street Sweeping Overview

Provides an overview of street sweeping, including the process, materials, areas to sweep, sweeping frequencies, and street waste disposal.

4.3 Program Elements

Introduces the different elements of street sweeping programs.

4.3.1 Administration

Describes administration needs for street sweeping programs.

4.3.2 Staffing

Describes staffing needs for street sweeping programs.

4.3.3 Scheduling

Describes considerations for street sweeping scheduling and communicating the schedule to the public.

4.3.4 Operations and Maintenance

Describes operations and maintenance practices for street sweeping programs, including sufficient storage for street sweepers and associated equipment.

4.3.5 Street Waste Disposal

Provides a high-level overview of street waste disposal referenced in Chapter 7.

4.3.6 Documentation & Reporting

Describes documentation and reporting needs for street sweeping programs. This section will reference the detailed description of documentation and reporting included in Chapter 6.

4.3.7 Training

Describes training needs for street sweeping programs.

4.4 Program Sizing

Describes the process for defining program scope and size best suited for the jurisdiction.



4.5 Program Organization

Illustrates options for organizational structure depending on program size and goals. This will include guidance on establishing collaboration between departments to meet program goals.

4.6 Street Sweeping Equipment

Describes the selection, maintenance, and replacement of different types of street sweeping equipment.

4.6.1 Equipment Selection

Introduces street sweepers and things to consider when selecting and purchasing a sweeper. This will include equipment necessary to sweep and/or maintain different surface types and areas too narrow for a full-sized sweeper.

4.6.2 Equipment Maintenance

Describes the best practices for street sweeper maintenance.

4.6.3 Equipment Replacement

Describes approximate lifecycle of different street sweepers and indications that equipment needs to be replaced.

4.7 Contracting vs. In-House Street Sweeping

Compares the jurisdictional workload between performing in-house street sweeping and contracting out a portion of or all street sweeping services. This section will include an example contract. Costs of contracting street sweeping are described in Chapter 8.

4.8 Other Program Considerations

Describes other aspects of street sweeping jurisdictions may want to consider when developing a street sweeping program.

4.8.1 Sweeping Nonstandard Curb Lines

Identifies types of nonstandard curb lines and methods to address these areas.

4.8.2 Wet Weather Practices

Describes best practices for street sweeping during wet weather.

4.8.3 Tree Impacts

Describes the impacts of leaves and pine needles on street sweeping and considerations for sweeping in areas with trees.

4.8.4 Parking Restrictions and Enforcement

Describes parking policies related to street sweeping and enforcement options.



4.8.5 Interlocal Agreements and Partnerships

Explains interlocal agreements and options for private/public partnerships.

Figures

- Examples of different types of sweepers
- Examples of program organization diagrams
- Examples of nonstandard curbs
- Examples of street sweeping parking restriction signs
- Example of the impacts of leaves and pine needles on street sweeping and pavement drainage

Tables

- Table summarizing street sweeping program staff and their potential roles
- Table summarizing street sweeper types, sizes, best uses, limitations, and costs
- Table summarizing street sweeper maintenance needs and frequencies
- Table summarizing street sweeper lifecycle and equipment replacement indicators

Appendices

- Example contract for hiring out street sweeping services
- Table summarizing street sweeping parking sign requirements
- Example contract for street sweeping interlocal agreements

Sources

- *Structural Stormwater Controls Science Review & Synthesis Project* by Navickis-Brasch, et al. (2021)
- *Street Sweeping—Cleaner Air, Clearer Water – How four different cities are handling dirt and debris* by Buranen (2018)
- *Sediment load estimation in combined sewer systems located in semi-arid areas: a case study* by Trapote & Egea (2016)
- *Street Sweeping – Report No. 3 Policy Development and Future Implementation Options for Water Quality Improvement* by Schilling (2005)
- *Evaluation of Street Sweeping as a Stormwater Quality-Management Tool in Three Residential Basins in Madison, Wisconsin* by Selbig & Bannerman (2007)
- *Resource for Implementing a Street Sweeping Best Practice* by Kuehl, et al. (2008)
- *City of Ellensburg Street Sweeping vs Catch Basin Cleaning Effectiveness Study Technical Evaluation Report (TER)* by Navickis-Brasch, et al. (2020)
- *Residential Street-Dirt Accumulation Rates and Chemical Composition, and Removal Efficiencies by Mechanical- and Vacuum-Type Sweepers, New Bedford, Massachusetts, 2003–04* by Breault, et al. (2005)
- *Effectiveness of Street Sweeping in Incline Village, NV* by Brown, et al. (2011)
- *Removal of road deposited sediments by sweeping and its contribution to highway runoff quality in Korea* by Jeong & Ko (2014)



- *Redmond Paired Watershed Study – Status Update* by City of Redmond, etc. (2018)
- *City of Ellensburg Street Sweeping vs Catch Basin Cleaning Effectiveness Study* by Navickis-Brasch, et al. (2018)
- *Recommendations of the Expert Panel to Define Removal Rates for Street and Storm Drain Cleaning Practices* by Schueler, et al. (2016)
- *Water Quality Assessment and Monitoring Study: Estimated Present-Day Contaminant Loadings to Duwamish Estuary/Elliott Bay and Lake Union/Ship Canal* by Bernhard, et al. (2017)
- *Quantifying the Impact of Catch Basin and Street Sweeping on Storm Water Quality for a Great Lakes Tributary: A Pilot Study* by Tetra Tech (2001)
- Minnesota Stormwater Manual: Street Sweeping



Chapter 5. OPTIMIZING STREET SWEEPING PRACTICES

Purpose: Provide guidance for designing sweeping routes, improving efficiency and efficacy of existing programs, and identifying variables that may influence efficiency and efficacy. This chapter will also include guidance for measuring performance for street sweeping activities.

5.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

5.2 Literature Synthesis: Variables that Impact Sweeping Efficiency and Efficacy

Summarizes the compilation of research findings related to the variables that influence the efficiency and efficacy of street sweeping practices.

5.3 Performance Measures for Street Sweeping Activities

Describes common performance measures for street sweeping activities.

5.4 Improving Efficiency and Efficacy of Street Sweeping Practices

Describes methods for improving efficiency and efficacy of street sweeping practices based on the information summarized in Section 5.2 and the performance measures described in Section 5.3.

5.5 Designing Street Sweeping Routes

Describes what to consider when planning optimal street sweeping routes and common methods.

5.5.1 Considerations when Designing Street Sweeping Routes

Describes things for Permittees to consider when designing street sweeping routes, such as scheduling, efficient decanting, and jurisdictional policies.

5.5.2 Grids

Describes designing street sweeping routes based on grids.

5.5.3 Areas

Describes designing street sweeping routes based on areas.

5.6 Addressing Common Street Sweeping Challenges

Addresses common street sweeping challenges, such as protruding tree limbs, sweeping during leaf season, parked vehicles along the curb line, inclement weather, pavement deficiencies, minimizing traffic disruptions, and minimizing trips to the dewater/decant facility.

Figures

- Example maps of street sweeping routes by route design method
- Example of protruding limbs and other street sweeping obstacles



Tables

- None

Appendices

- None

Sources

- *Street Sweeping—Cleaner Air, Clearer Water – How four different cities are handling dirt and debris* by Buranen (2018)
- *Street Sweeping – Report No. 3 Policy Development and Future Implementation Options for Water Quality Improvement* by Schilling (2005)
- *Resource for Implementing a Street Sweeping Best Practice* by Kuehl, et al. (2008)
- *Street Dust: Implications for Stormwater and Air Quality, and Environmental Management Through Street Sweeping* by Calvillo, et al. (2015)
- *Water Quality Assessment and Monitoring Study: Estimated Present-Day Contaminant Loadings to Duwamish Estuary/Elliott Bay and Lake Union/Ship Canal* by Wright, et al. (2017)
- *Street Sweeping – Pilot Studies – Bringing program improvements to San Diego* by Brown & Evans (2013)
- *Stormwater Strategies for Arid and Semi-Arid Watersheds* by Caraco & Scheuler (2000)
- *Quantifying the Impact of Catch Basin and Street Sweeping on Storm Water Quality for a Great Lakes Tributary: A Pilot Study* by Tetra Tech (2001)



Chapter 6. DOCUMENTING, TRACKING, AND COLLECTING DATA FOR STREET SWEEPING ACTIVITIES

Purpose: Provide guidance for documenting, tracking, and collecting data for street sweeping activities to assist Permittees with MS4 Permit compliance, tracking program costs, and improving program activities.

6.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

6.2 Data Collection

Lists the types of data to collect to identify and refine priority sweeping areas; measure effectiveness; improve program efficiency; and meet Permit documentation and reporting requirements. This section will also describe the methods for collecting data and who may potentially collect data.

6.2.1 Data to be Collected

Describes specific data for jurisdictions to collect.

6.2.2 Supplementing Missing Data

Describes methods for supplementing missing data with data from literature.

6.3 Tracking

Describes different methods for tracking street sweeping activities for MS4 Permit documentation and reporting purposes. This section will also offer guidance on setting up digital tracking systems (GIS).

6.3.1 Information to Track

Describes useful information for Permittees to track.

6.3.2 Manual Tracking Methods

Describes manual methods for tracking street sweeping activities.

6.3.3 Automated Tracking Methods

Describes automated methods for tracking street sweeping activities and offers guidance on setting up digital tracking systems (GIS).

6.4 Documentation and Reporting

Lists street sweeping documentation and the reporting required by the MS4 Permits, as well as additional documentation that may be useful for jurisdictions.

6.4.1 Permit Documentation and Reporting Requirements

Describes documentation and reporting requirements per the MS4 Permits and WAC Title 173 Chapter 173-350 Solid Waste Handling Standards.



6.4.2 Additional Documentation

Describes additional documentation that may be useful for jurisdictions.

Figures

- Diagram showing how collected data can be used

Tables

- Table summarizing data to collect, methods, and best uses
- Table with advantages and disadvantages of what to track

Appendices

- Manual tracking template
- Example tracking and reporting documentation

Sources

- *Structural Stormwater Controls Science Review & Synthesis Project* by Navickis-Brasch, et al. (2021)
- Washington Administrative Code (WAC) 173-350-320
- *Pollutant Loading to Stormwater Runoff from Highways: Impact of a Highway Sweeping Program* by Horwath & Bannerman (2009)
- *Review of Historical Street Dust and Dirt Accumulation and Washoff Data* by Pitt, et al. (2004)
- *Determining the State of the Practice in Data Collection and Performance Measurement of Stormwater Best Management Practices* by Mayfield, et al. (2014)
- *Characterization of Street Sweeping Material for Addressing Total Maximum Daily Waste Load Allocations* by Lee F. Hixon and Randel L. Dymond (2019)



Chapter 7. DISPOSING OF STREET SWEEPING WASTE

Purpose: Provide guidance for disposing of street sweeping waste, both liquids and solids. This Chapter will also describe estimating the size and quantity needed for decant facilities and for planning the design, construction, and operation of a decant facility.

7.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

7.2 Applicable Permit Requirements

Summarizes the disposal requirements included in Appendix 6 of the Phase I and Phase II MS4 Permits and WAC Title 173 Chapter 173-350-320. This section will also describe potentially applicable wastewater discharge and industrial landfill permits.

7.3 Street Sweeping Waste Treatment and Disposal

Describes the methods Permittees can use to treat and dispose of street sweeping waste.

7.3.1 Wastewater Treatment and Disposal

Summarizes wastewater treatment requirements and outlines options for treatment and disposal.

7.3.2 Solids Disposal

Provides options for street sweeping solids waste disposal. This will include methods for describing when decant materials need to be sampled.

7.4 Estimating Generated Waste and Decant Facility Size

Explains approaches to estimating the quantity of waste generated from street sweeping and the number and size of decant facilities a jurisdiction may need for a street sweeping program.

7.4.1 Estimating Generated Waste

Describes estimating the quantity of waste generated from street sweeping based on specific jurisdictional conditions (road-miles, sweeping frequency, land use, traffic volumes, climate, tree-cover, etc.). This section will include a tool/spreadsheet that Permittees can use to input the jurisdictional conditions in order to estimate the amount of waste generated.

7.4.2 Decant Facility Sizing

Describes estimating the size and quantity of decant facilities a jurisdiction may need for a street sweeping program. This section will include a tool/spreadsheet for decant facility sizing.

7.5 Planning, Designing, and Operating Decant Facilities

Explains the need for decant facilities and guides planning construction and operation of new decant facilities.



7.5.1 Decant Facility Planning

Describes the planning process for constructing a new decant facility.

7.5.2 Decant Facility Design

Describes the process for designing a new decant facility.

7.5.3 Decant Facility Operations and Maintenance

Provides a brief description of operating and maintaining a decant facility and provides a link to previous decant facility studies that include O&M plans.

Figures

- Examples of decant facilities

Tables

- Table summarizing MS4 Permit requirements
- Table summarizing disposal requirements

Appendices

- Spreadsheet Permittees can use to estimate generated waste
- Spreadsheet Permittees can use to size decant facilities

Sources

- Washington Administrative Code (WAC) 173-350-320
 - Piles used for storage or treatment – Applicability
- *Metal content and particle size distribution of street sediments and street sweeping waste* by German & Svensson (2002)
- *2014 SWMMWW Volume IV Source Control BMPs Appendix IV-G Recommendations for Management of Street Wastes* by Ecology (2019)
- *Managing Street Sweepings* by Minnesota Pollution Control Agency (2010)
- *Strategic Decant Facility Siting Study & Associated Appendices* by Herrera Environmental Consultants, Inc. (2013)
- *Quantifying the Impact of Catch Basin and Street Sweeping on Storm Water Quality for a Great Lakes Tributary: A Pilot Study* by Tetra Tech (2001)
- Minnesota Stormwater Manual: Street Sweeping



Chapter 8. STREET SWEEPING COST CONSIDERATIONS

Purpose: Provide guidance for estimating and funding street sweeping program costs.

8.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

8.2 Street Sweeping Staff and Resources

Summarizes methods for estimating full-time employees (FTEs) and resources necessary to operate a street sweeping program.

8.2.1 Workforce Development Program

Describes the process of developing a Workforce Development Program.

8.3 Lifecycle Cost Estimating

Explains methods for conducting lifecycle cost estimates and growth projections. This will include using data and/or information collected by the jurisdiction or from literature. Cost considerations for program operation and street sweeper maintenance and replacement will also be included, along with a cost-estimating spreadsheet.

8.4 Funding

Describes potential funding opportunities, criteria for approval, and overview of the application process. This will include information about Ecology-funded grants.

8.5 Contracting vs. In-House Street Sweeping

Compares the cost and time investment between performing in-house street sweeping and contracting out street sweeping services.

Figures

- Workforce diagram

Tables

- Table summarizing funding sources and qualification criteria

Appendices

- Spreadsheet Permittees can use to develop program costs

Sources

- *Street and Stormwater Structure Cleaning Program Development and Evaluation Project Introduction* by Sutherland (2009)



- *Structural Stormwater Controls Science Review & Synthesis Project* by Navickis-Brasch, et al. (2021)
- *Street Sweeping – Report No. 3 Policy Development and Future Implementation Options for Water Quality Improvement* by Schilling (2005)
- *Effectiveness of Basin-Wide Stormwater Best Management Practices Thea Foss Drainage Basin, City of Tacoma* by Anchor QEA LLC, et al. (2012)
- *Quantifying the Impact of Catch Basin and Street Sweeping on Storm Water Quality for a Great Lakes Tributary: A Pilot Study* by Tetra Tech (2001)
- Minnesota Stormwater Manual: Street Sweeping



Chapter 9. OTHER CONSIDERATIONS

Purpose: Describe topics that do not fit in other chapters, but Permittees may need to know when implementing a street sweeping program.

9.1 Chapter Introduction

Introduces the chapter and summarizes its contents.

9.2 Emerging Contaminants

Describes recent research and findings on emerging contaminants of concern.

9.3 Impacts of Sand and Deicers

Describes the impacts of sand and deicers.

Figures

- Example of sand and/or deicer on roadways

Tables

- None

Appendices

- None

Sources

- *White Paper for Stormwater Management Program Effectiveness Literature Review Operation and Maintenance* by Milesi (2013)
- *Maintenance in Lieu of Structural BMPs* by WSDOT (2005)
- *Characterization of Street Sweeping Material for Addressing Total Maximum Daily Waste Load Allocations* by Hixon & Dymond (2019)
- *Metals and PAHs adsorbed to street particles* by Lau & Stenstrom (2005)



INTERVIEWS FOR MANUAL DEVELOPMENT

- Megan Darrow, City of Monroe
- John Kalmbach, City of Renton
- Sue Barclift, City of Olympia
- Travis Rakestraw
- Mike Vermeulen, City of Issaquah
- Jeff Rudolph, Pierce County
- Tim Allmann
- Sean Mulderig, City of Washougal
- Derek Stutz, Clark County
- Dave Kangiser, City of Tumwater
- Shelly Basketfield, City of Seattle
- Dana de Leon, City of Tacoma
- Paul Marrinan, City of Puyallup
- Nick Bemis, Thurston County
- Scott Johnston, City of Lacey
- Larry Schaffner, Thurston County

CASE STUDIES & LESSONS LEARNED

Laurie Larson-Pugh will coordinate with TAC members and volunteers to develop case studies and lessons learned. Case studies will be recorded and posted on the WSC website, as well as referenced throughout the manual in applicable sections.

