CITY OF SOAP LAKE

GRANT COUNTY **WASHINGTON**

STREET SWEEPING PLAN

G&O #18047
SEPTEMBER 2019

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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INTRODUCTION

Soap Lake is a unique body of water considered to be of medicinal value and known for its rich mineral waters. The City is concerned that by draining its stormwater into this lake, it will pollute the waters with sediment, nutrients, and metals which will dilute Soap Lake's unique mineral properties. There are six outfalls from the City which drain stormwater directly into Soap Lake. In order to protect this body of water, the City desires to implement a street sweeping plan to remove contaminants before they can be transported to the lake.

BACKGROUND

In 2015, the City filed a funding application to the Washington State Department of Ecology Water Quality Combined Financial Assistance program to purchase a street sweeper and complete a street sweeping plan. The funding application includes a provision to monitor the street sweeping over a period of three years in order to determine the effects of street sweeping on water pollution reduction.

The City uses an Elgin Crosswind Series J regenerative air street sweeper to remove sediments and other contaminants. Typical operating conditions and key equipment data include the following:

- 5 mph average forward speed.
- 240 gallon water capacity.
- 8 cubic yards waste capacity.

PURPOSE

The purpose of this plan is to identify critical areas with the greatest possibility of transferring pollutants into Soap Lake, identify areas most benefited by street sweeping, establish a suitable street sweeping schedule, and outline a plan to verify the success of the street sweeping program by measuring and properly disposing of removed pollutants.

The Minnesota Department of Transportation (MnDOT) and Local Road Research Board publication "Resource for Implementing a Street Sweeping Best Practice" lists the following five reasons to sweep streets:

Water Quality: This is the top concern for the City of Soap Lake. Because of the lake's unique properties, many people are drawn to the City of Soap Lake in order to take advantage of the potential benefits of the lake. Possible benefits of immersion in the lake water include improved circulation in the capillaries of people affected by Buerger's disease and Raynaud's disease and the potential for the high alkalinity water to kill

bacteria and viruses. The City recognizes that the unique properties of the lake are one of its main sources of tourism, which is a major component of the City's economy.

Potential contaminants in urban stormwater include coarse sediments (gravel and sand), fine sediments (silt and clay), metals such as lead, zinc, and copper, nutrients such as phosphorous and nitrogen, fecal coliform from pet and animal waste, and hydrocarbons such as oil and grease from vehicles. According to the MnDOT study, fine sediments can contain as many as ten times more metal, nutrient, and hydrocarbon pollutants than coarse sediments. Vacuum and regenerative air street sweepers are typically most effective at removing fine sediments.

Air Quality: High levels of fine particles (PM_{10} which are less than 10 micrometers in diameter) in the air can cause respiratory issues, asthma, and increases in hospitalizations and mortality rates. Fugitive dust from roadways can contribute to fine particle concentrations in the air. High efficiency regenerative air sweepers are most successful in removing fine particles and improving air quality.

Appearance- Debris and Trash Removal: A clean appearance free from debris is particularly important in the central business district. A clean street provides a pleasing environment for customers and tourists. Removal of debris such as leaves in the fall and sand in the spring also plays an important role in keeping gutter lines and catch basins both clean and hydraulically functional.

Roadway Maintenance and Clean-Up: Street sweeping prior to roadway maintenance such as crack sealing or chip sealing is an important step which can help to ensure that maintenance efforts are successful. By sweeping the street prior to commencing roadway maintenance activities, the City can remove debris and sediment and ensure that the surface is prepared for the crack sealant or asphalt binder. Sweeping for this purpose is best accomplished by regenerative air or vacuum sweepers.

Safety: Buildup of sediment and debris can cause skidding, loss of control, and increased braking distances, particularly for motorcycles. In addition, sediment and other hazards can accumulate in bicycle lanes adjacent to the curb, forcing cyclists into the travel lane.

PLAN ELEMENTS

There are several key elements in this plan which will be used to determine the optimal street sweeping plan and to gauge the effectiveness of street sweeping in reducing water pollution. Key elements include the following:

- Identification of Critical Areas: Determine the areas which are most likely to impact water quality in Soap Lake and which areas will be most benefited by street sweeping.
- Street Sweeping Schedule: Determine the frequency of street sweeping to optimize pollutant removal and allocation of City resources.

- Testing and Disposal Plan: Determine the amount and types of pollutants removed and how to properly dispose them.
- Evaluation of Success: Determine how water quality in Soap Lake is impacted by completion of street sweeping.

CRITICAL AREAS

Critical areas include locations which are likely to transfer pollutants to the lake. These areas include streets which are closest to the lake and streets which have storm drainage piping outlets to the lake. The City's stormwater management plan shows six storm drainage outlets which connect to the lake. The outlets are connected to storm drainage piping from the following locations: Daisy Street, Main Avenue East, Main Avenue West (two outlets), Evergreen Street North, and Lakeshore Drive where it connects to Fir Street North. Due to their proximity to the lake and their piping connections to the lake, these roadways are considered prime candidates for regular street sweeping.

There are also several other criteria to consider when evaluating the effectiveness of street sweeping, as discussed in the following sections.

Curb and Gutter/ Roadway Barriers

Without a barrier such as a curb, most of the sediment flows off of the roadway with stormwater. Streets without curb and gutter may be swept on occasion due to specific circumstances such as a spill or a dust storm, but many studies have found sweeping of streets without curb and gutter to be of questionable water quality benefit. According to TYMCO, a leading manufacturer of regenerative air street sweepers, up to 75 to 90 percent of sediment and associated pollutants are located within one to three feet of the curb line. A Portland Bureau of Transportation study found that 97 percent of debris lies within 40-inches of the curb. Many cities do not sweep streets without curb and gutter for this reason.

Figure 1 shows the location of curbing on City streets as determined from the aerial mapping.

Pavement Condition

Pavement condition can play a large factor in the effectiveness of a street sweeping program. Roadways with pavement failure including uneven surfaces, potholes, and deep cracks can accumulate sediment which a street sweeper may not be able to effectively remove. In addition, street sweeping of poor condition roadways may cause some of the loose and broken pavement (or chips from a chip seal) to be removed rather than the targeted pollutants. Maintenance of street surfaces contributes to the success of a street sweeping program.

Figure 2 shows the City's pavement condition ratings, as determined from the

Transportation Improvement Board's (TIB) most recent survey on May 1, 2015. Gravel streets and state routes are not rated by TIB and are not labeled on the figure. Table 1 shows the lengths and percentages of roadways classified between "Reconstruction" condition and "Excellent" condition. As shown in the table, the majority of the City's streets are in poor condition or in need of reconstruction, and this may impact the effectiveness of street sweeping operations.

TABLE 1

City Street Conditions

Condition	Length (LF)	Percentage
Excellent	9,030	13.0%
Good	11,950	17.1%
Fair	9,600	13.8%
Poor	16,110	23.1%
Reconstruction	23,000	33.0%
Total	**69,690**	**100%**

Pollutant Loading

Pollutant loading varies according to factors such as adjacent land use and traffic volumes. In general, streets with higher traffic volumes will generate more pollutants, particularly hydrocarbons and metals. Streets next to industrial sites, fueling areas, and other business also are more likely to contain more pollutants. These criteria suggest that Daisy Street North, Main Avenue East, and Division Avenue are most likely to experience higher pollutant loads and may benefit from more frequent street sweeping.

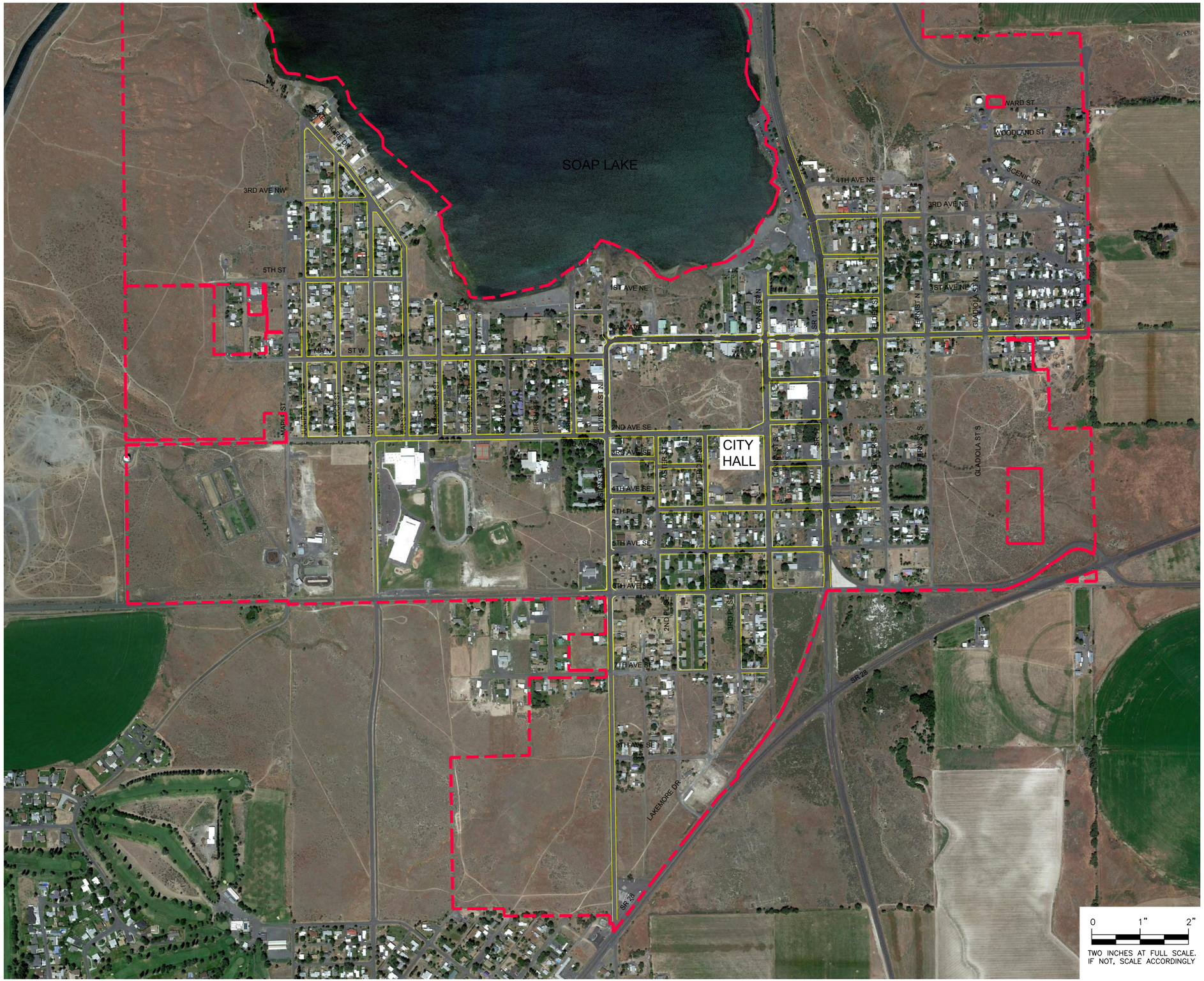
Parked Cars

On-street parking can greatly impact the effectiveness of street sweeping. TYMCO estimates that the most skilled street sweeper operators can minimize the interference of a parked car to a distance of approximately one car length on either side of the parked car. For example, a single parked car 17 feet in length may result in over 50 feet of curb being left unswept.

The effect of parked cars can be mitigated by sweeping commercial areas in the early morning and residential areas in the daytime. Parking regulations and communication of street sweeping scheduling can also be used to mitigate the effect of parked cars.

STREET SWEEPING SCHEDULE

Street sweeping frequencies vary by municipality and are also affected by various other factors such as climate and season (freezing weather, road salts and sands, leaf accumulation), traffic volume, adjacent land uses, and available resources. The MnDOT



400' 200' 0 400' 800'

SCALE: 1"=400'

LOCATIONS WITH CURB AND GUTTER

CITY LIMITS

0 1" 2"

TWO INCHES AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

CITY OF SOAP LAKE

STREET SWEEPING PLAN

FIGURE 1

STREET WITH CURB AND GUTTER

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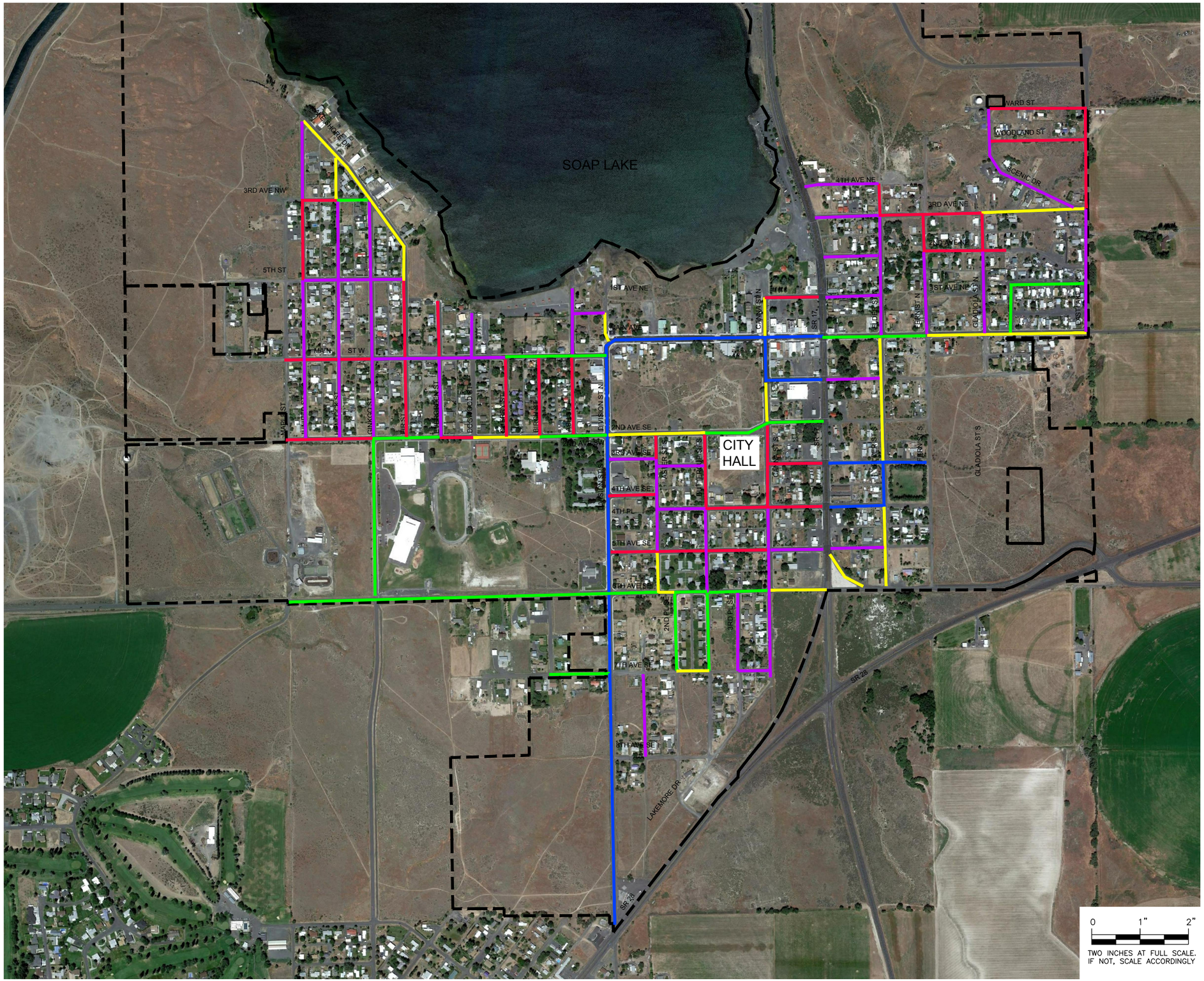

400' 200' 0 400' 800'

SCALE: 1"=400'

- CITY LIMITS
- EXCELLENT CONDITION
- GOOD CONDITION
- FAIR CONDITION
- POOR CONDITION
- RECONSTRUCTION CONDITION

0 1" 2"

TWO INCHES AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

CITY OF SOAP LAKE

STREET SWEEPING PLAN

FIGURE 2

STREET CONDITION MAP

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study reported that 66 to 76 percent of the U.S. and Canadian agencies polled about street sweeping frequency reported sweeping between 3-26 times per year. Once per month is a popular street sweeping frequency, but some agencies report that they sweep critical areas as frequently as every week. A pilot study performed by Seattle Public Utilities and Herrera Environmental Consultants recommended sweeping streets every other week.

Figure 3 shows a proposed street sweeping map and schedule, excluding winter months when street sweeping is suspended. Sweeping frequency has been split into the following three priorities based on the determination of critical areas:

- Priority 1: Streets which have storm drainage structures and piping connected directly to the lake are considered to be the top priority for preserving water quality. Consideration was also given to the potential for surface flow of stormwater from the street to the lake. Other factors considered are the inclusion of the Central Business District, traffic volumes, and pavement condition.
- Priority 2: Streets which may experience surface flow of stormwater toward the lake and streets with higher traffic volumes were assigned Priority 2 status.
- Priority 3: Streets with lower traffic volumes which are not likely to discharge stormwater to the lake were assigned Priority 3 status.

The average reported speed for street sweeping operations is 5 mph. The approximate length of streets to be swept in the City is 17.5 curb-miles. Including stops to empty the waste holding tank, it takes the City approximately six to eight hours to sweep all streets. Because all streets can be swept within one day, it is recommended that the City notify residents of a specific day each month (e.g.: the first Monday of each month) that street sweeping will occur so that parked cars can be moved. By operating according to a predictable schedule, the City may be able to greatly reduce the inefficiencies caused by parked cars.

The City is encouraged to monitor the accumulation of sediment to determine the effectiveness of more or less frequent sweeping. For example, if sweeping the Central Business District every week collects nearly twice as much waste as sweeping every other week, then the frequent sweeping is justified on the basis of preventing pollutants from entering Soap Lake and preserving the appearance of the Central Business District.

TESTING AND DISPOSAL PLAN

Provisions in the Ecology funding agreement require the City to test the street waste prior to disposal to verify the types of pollutants removed. The Washington Department of Ecology (DOE) 2019 *Stormwater Management Manual for Eastern Washington* includes best management practices for managing street waste in Appendix 8B of the manual. Sampling typically shows that street waste from routine maintenance does not classify as dangerous waste. However, street waste from areas with “exceptionally high average

daily traffic counts may contain contaminants, such as heavy metals, total petroleum hydrocarbons (TPH), and carcinogenic polycyclic aromatic hydrocarbons (c-PAH), at levels that limit reuse options." Street waste that is suspected to be dangerous should not be mixed with other street waste. Street waste is classified as solid waste and is usually disposed in landfills, although some recycling options are available for non-contaminated materials.

DOE reports that local health departments have primary jurisdiction over solid waste management and should be contacted to determine if a street waste meets the definition of "clean soil" if it will be reused. Street waste disposal regulation is not highly standardized, but many local health districts have used the Model Toxics Control Act Cleanup Regulation (MTCA) Method A residential soil cleanup levels to approximate "clean" soils and to determine the suitability of reuse. Table 2 shows DOE's recommended parameters for street waste testing.

TABLE 2

DOE Recommended Parameters and Suggested Values for Determining Reuse and Disposal Options

Parameter	Suggested Maximum Value (mg/kg)
Arsenic, total	20.0
Cadmium, total	2.0
Chromium, total	42
Lead, total	250
Nickel	100
Zinc	270
Mercury (inorganic)	2.0
PAHs (carcinogenic)	0.1-2.0
TPH (heavy fuel oil)	200-460
TPH (diesel)	200-460
TPH (gasoline)	100
Benzene	0.03
Ethylbenzene	6
Toluene	7
Xylenes (total)	9

(1) See Table 8B-1 of the *Stormwater Management Manual for Eastern Washington* (2004) for additional descriptions of maximum contaminant levels.

Appendix A includes the table above and space for recordkeeping of the waste collection and sample results. The particle size distribution is also included in Appendix A because it can affect the reusability of the waste and because smaller particle sizes are typically correlated with higher pollutant adsorption. Total nitrogen and phosphorous have also been added to the table so that the City can estimate the reduction in nutrient flow to the lake due to the street sweeping efforts. Appendix B includes the excerpt "Appendix 8B –

Best Management Practices for Managing Street Waste" from the Department of Ecology's *Stormwater Management Manual for Eastern Washington* for further reference.

Table 3 shows the recommended sampling frequency for street waste solids as directed by DOE.

TABLE 3

DOE Recommended Sampling Frequency for Street Waste Solids

Cubic Yards of Soil	Minimum Number of Samples
0 - 100	3
101 – 500	5
501 – 1000	7
1001 – 2000	10
>2000	10 + 1 for each additional 500 cubic yards

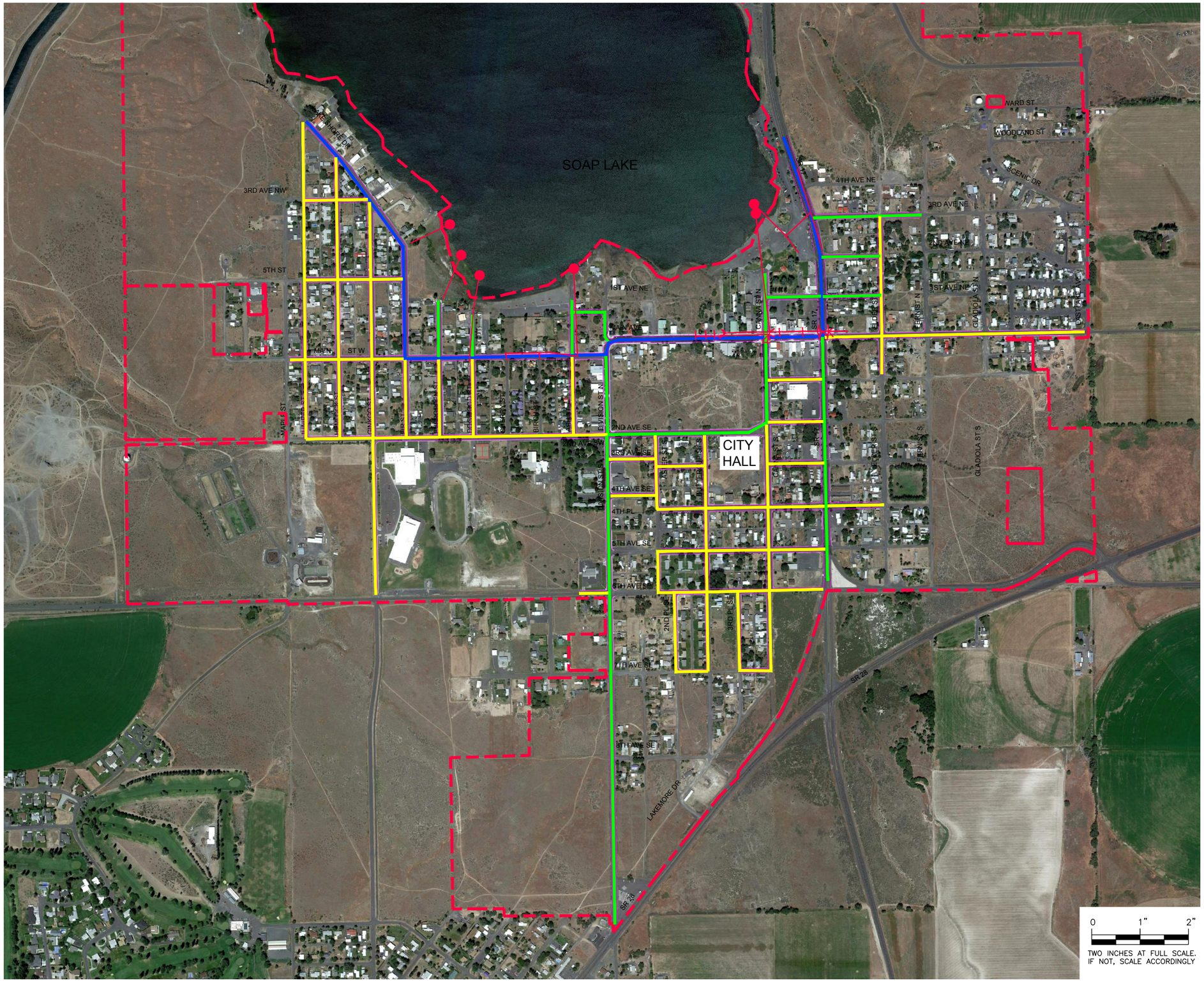
The EPA estimates that approximately 20.25 tons of waste can be removed per street mile. Assuming that there are 9 street miles to be swept (approximately half of the total curb-miles) and that the specific gravity of the waste is 2.6, approximately 83 cubic yards of waste would be generated annually. However, the Seattle pilot study reported an average dry sediment removal rate of 4,900 pounds per curb-mile. Under those assumptions, approximately 20 cubic yards of waste would be generated annually. The City will track its annual waste production and will likely need to test three samples.

According to DOE, street waste handling facilities are subject to the requirements of the "Minimal Functional Standards for Solid Waste Handling." Most street waste facilities are permitted under the section dealing with "Piles Used for Storage and Treatment" (WAC 173-350-320). Section (d) states that "the storage of inert waste in piles at a facility with a total volume of two hundred fifty cubic yards or less is subject solely to the requirements of (e)(iv) of this subsection." Section (iv) requires compliance with the performance standards of WAC 173-350-040. If the City stores its street waste and disposes of it annually, it will need to store it per these requirements. For reference, a checklist for "Piles Used for Storage or Treatment" is included in the Appendix C.

Disposal Options

Appendix 8B of the previous 2004 DOE stormwater manual includes the following suggestions which the City may utilize to dispose of waste which is not contaminated beyond the limits shown in Appendix A:

- Street sweepings that consist primarily of leaves, pine needles and branches, and grass cuttings from mowing grassy swales can be composted. Litter and other foreign material must be removed prior to



400' 200' 0 400' 800'

SCALE: 1"=400'

LOCATIONS WITH CURB AND GUTTER

CITY LIMITS

STORM DRAINAGE OUTFALL

PIPING CONNECTED TO OUTFALL

STREET SWEEPING SCHEDULE

COLOR	PRIORITY	CURB MILES	ACTION
	1	2.8	SWEEP EVERY OTHER WEEK
	2	4.7	SWEEP MONTHLY
	3	10.0	SWEEP EVERY OTHER MONTH*
	TOTAL	17.5	

*ADDITIONAL STREET SWEEPING IS COMPLETED ON AN AS-NEEDED BASIS TO COLLECT SAND USED DURING THE WINTER AND TO COLLECT LEAVES THAT FALL DURING AUTUMN.

0 1" 2"

TWO INCHES AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

CITY OF SOAP LAKE

STREET SWEEPING PLAN

FIGURE 3

STREET SWEEPING SCHEDULE

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M:\Soap Lake\18047 - Street Sweeping Plan\Figures\Figure 3- Street Sweeping Schedule.dwg, 7/24/2019 1:17 PM, TIM DEVRIES

composting or the composting facility must provide for such removal as part of the process. The screened trash is solid waste and must be disposed of at an appropriate solid waste handling facility.

- Coarse sand screened from street sweeping after recent road sanding, may be reused for street sanding, providing there is no obvious contamination from spills. The screened trash is solid waste and must be disposed of at an appropriate solid waste handling facility.
- Fill in parks, play fields, golf courses, and other recreational settings, where direct exposure by the public is limited or prevented. One way to accomplish this is to cover the fill with sod, grass, or other capping material to reduce the risk of soil being ingested. The level of contaminants in the street waste must be evaluated to ensure that the soils meet the definition of clean soils when used in this manner.
- Fill in commercial and industrial areas, including soil or top dressing for use at industrial sites, roadway medians, airport infields and similar sites, where there is limited direct human contact with the soil, and the soils will be stabilized with vegetation or other means. The level of contaminants in the street waste must be evaluated to ensure that the soils meet the definition of clean soils when used in this manner.
- Top dressing on roadway slopes, road or parking lot construction material and road subgrade, parking lot subgrade, or other road fill. The level of contaminants in the street waste must be evaluated to ensure that the soils meet the definition of clean soils when used in this manner.
- Daily cover or fill in a permitted municipal solid waste landfill, provided the street waste solids have been dewatered. Street waste solids may be acceptable as final cover during a landfill closure. The local health department and landfill operator should be consulted to determine conditions of acceptance.

For street waste with contaminants exceeding the maximum values in Appendix A, the following options are available:

- Treatment at a permitted contaminated soil treatment facility.
- Recycling through incorporation into a manufactured product, such as Portland cement, prefab concrete, or asphalt. The facility operator should be consulted to determine conditions of acceptance.
- Other end-use as approved by the local health department
- Disposal at an appropriate solid waste handling facility.

By testing its street waste, the City will be able to determine the pollutants which were prevented from entering the lake and determine the best way to dispose of the waste.

EVALUATION OF SUCCESS

Water quality within the unique waters of Soap Lake is a primary concern for the City

and its economy. The unique composition of the water draws many visitors. Without street sweeping, the City's stormwater would contribute contaminants such as metals, hydrocarbons, and nutrients which would negatively impact the lake.

Implementation of this plan will help to protect water quality in the lake and will provide quantitative measures of the water quality benefits that street sweeping provides. City records will show the tonnage of waste removed for a given period of time and the concentrations of contaminants within that waste. These records will be the primary resource in determining the success of the street sweeping plan.

APPENDIX A

RECORDKEEPING OF WASTE COLLECTION AND SAMPLE TEST RESULTS

City of Soap Lake		Sweeping Interval			
Street Waste Testing Records			to		
	MTCA Method A Soil Cleanup Level (mg/kg)[(1)]	Test Date:			
		Weight to Dispose:			Tons
Parameter		Sample 1	Sample 2	Sample 3	Average
Metals					
Arsenic	20				
Cadmium	2.0				
Chromium	42				
Lead	250				
Nickel	100				
Zinc	270				
Mercury (inorganic)	2.0				
Hydrocarbons					
PAHs (carcinogenic)	0.1-2.0				
TPH (heavy fuel oil)	200-460				
TPH (diesel)	200-460				
TPH (gasoline)	100				
Benzene	0.03				
Ethylbenzene	6				
Toluene	7				
Xylenes (total)	9				
Nutrients					
Total Nitrogen	-				
Phosphorous	-				
Grain Size Analysis (%)					
Gravel (>2 mm)	-				
Coarse Sand (0.25-2 mm)	-				
Fine Sand (75-250 μm)	-				
Silt (2 to 75 μm)	-				
Clay (<2 μm)	-				

(1) See Table 8B-1 of the Stormwater Management Manual for Eastern Washington (2004) for additional descriptions of maximum contaminant levels.

City of Soap Lake - Street Sweeping Waste Collection Records					
Date	**Curb Miles Swept**	**Waste Collected (Tons)**	**Date**	**Curb Miles Swept**	**Waste Collected (Tons)**

APPENDIX B

DOE STORMWATER MANUAL APPENDIX 8B

Appendix 8-B: Management of Street Waste Solids and Liquids

8.B.1 Introduction

This appendix addresses street waste as defined in chapter 173-350 WAC, Solid waste handling standards. WAC 173-350 is the governing rule for management of typical street waste solids. Ecology adopted revisions to this rule that became effective September 1, 2018, in part to provide clarity on managing soils impacted by release of contaminants, such as street waste. Ecology has solid waste guidance to help ensure handlers of street waste manage it in accordance with WAC 173-350. End users and other authorities may have their own requirements for street waste reuse and handling.

- Per WAC 173-350:
    - **"Street waste"** means solids or dewatered materials collected from stormwater catch basins and similar stormwater treatment and conveyance structures, and materials collected during street and parking lot sweeping.

"Street waste," as defined here, does not include solids and liquids from street washing using detergents, cleaning of electrical vaults, vehicle wash sediment traps, restaurant grease traps, industrial process waste, sanitary sewage, mixed process, or combined sewage/stormwater wastes. Wastes from oil/water separators at sites that load fuel are not included as street waste. Street waste also does not include flood debris, landslide debris, and chip seal gravel.

8.B.2 Regulations for Street Waste Management

Street waste is solid waste. While street waste from routine road maintenance is likely not dangerous waste, it is presumed to be solid waste under WAC 173-350. This Rule classifies Street Waste as a likely “contaminated soil," which is included in the definition of “solid waste.” Since stormwater conveyance structures are places where contaminants from streets can accumulate at concentrations that could be harmful for indiscriminant placement, material from such structures is presumed to be “contaminated soil.”

- Per WAC 173-350:
    - **"Contaminated soil"** means soil containing one or more contaminants from a release and when moved from one location to another for placement on or into the ground:
        a. Contains contaminants at concentrations that exceed a cleanup level under chapter 173-340 WAC, Model Toxics Control Act—Cleanup, that would be established for existing land use at the location where soil is placed; or
        b. Contains contaminants that affect pH, and pH of the soil is below 4.5 or above 9.5 or is not within natural background pH limits that exist at the location where soil is placed.

        Unless excluded in WAC 173-350-020, contaminated soil is solid waste and must be managed at a solid waste handling facility in conformance with this

chapter or chapter 173-351 WAC, Criteria for municipal solid waste landfills. Characterization of material may be required based on solid waste facility acceptance standards. Examples of potentially contaminated soil may include, but are not limited to, street waste, petroleum contaminated soil, engineered soil, and soil likely to have contaminants from a release associated with industrial or historical activities.

Based on test results, street waste could contain contaminants at concentrations that would require either disposal at a permitted solid waste disposal facility, or treatment at a permitted solid waste handling facility for use.

Owners/operators storing or treating street waste prior to disposal or use are typically subject to permitting under the section in WAC 173-350 dealing with "piles used for storage and treatment," since most storage and treatment takes place in outdoor piles. Indoor or other storage or treatment is subject to permitting under the section dealing with "transfer stations and drop boxes." To obtain a permit, an owner/operator will need to meet design standards, operating requirements, including characterization procedures and concentration limits if propose to use materials, and record keeping and reporting.

Note: Decant facilities are not subject to solid waste permitting if they will not have intermediate storage or treatment of decanted solids between the decant part of a facility operating in conformance with water quality rules and placement into transfer vehicles going to permitted solid waste facilities.

Street waste solids may contain contaminants at levels too high to allow unrestricted use. Street waste will need to meet the definition in WAC 173-350 for "clean soil" in order for its management or use outside of permitted solid waste handling facilities. "Clean soil" is tied to meeting contaminant concentrations so as not to create a cleanup site where placement of materials would occur.

- Per WAC 173-350:
    - **"Clean soil"** means soil that does not contain contaminants from a release. It also includes soil that contains one or more contaminants from a release and when moved from one location to another for placement on or into the ground:
        a. Does not contain contaminants at concentrations that exceed a cleanup level under chapter 173-340 WAC, Model Toxics Control Act—Cleanup, that would be established for existing land use at the location where soil is placed; or
        b. Contains contaminants that affect pH, but pH of the soil is between 4.5 and 9.5 or within natural background pH limits that exist at the location where soil is placed.

        Examples of potentially clean soil may include, but are not limited to, soil from undeveloped lands unlikely to have impacts from release of contaminants associated with area-wide or local industrial or historical activities. This includes similar soils over which development may have occurred but land use is unlikely to have led to a release, such as use for residential housing, or over which development provided protection from impacts from a release, such as coverage by pavement. Soil with substances from natural background conditions, as natural background is defined in WAC 173-350-100, is clean soil under this section.

Street waste that will go directly to a permitted landfill or transfer station is not subject to the standards of WAC 173-350, though operators will need to adhere to receiving facility acceptance criteria. For street waste that will not go directly to a permitted landfill or transfer station, an operator needs to consult with their jurisdictional health department to see what solid waste regulations apply to street waste management. In Washington, chapter 70.95 RCW, Solid waste management – Reduction and recycling, gives jurisdictional health departments primary authority over solid waste handling and permitting.

As stated earlier, guidance will be available soon with more specificity on how to manage "contaminated soil" under the recently revised WAC 173-350.

8.B.3 Contaminants in Street Waste Solids

Street waste does not typically classify as dangerous waste. The owner of the stormwater facility and/or collector of street waste is considered the waste generator and responsible for deciding whether the waste designates as dangerous waste. However, sampling has historically shown that material from routine maintenance of roads and stormwater facilities does not classify as dangerous waste.

It is possible that street waste from spill sites has high enough concentration of contaminants to classify it as dangerous waste. Street waste suspected to be dangerous waste should not be collected with other street waste to avoid creating a larger volume of dangerous waste. Street waste with obvious contamination (unusual color, staining, corrosion, unusual odors, fumes, and oily sheen) should be left in place or segregated until tested. Base testing activities on probable contaminants. If collecting potentially dangerous waste because of emergency conditions, or if the waste becomes suspect after it is collected, an owner/operator should handle and store it separately until a determination as to proper disposal is made. Dangerous waste must be handled following chapter 173-303 WAC, Dangerous waste regulations.

Test results from sampling street waste show that it contains contaminants including total petroleum hydrocarbons (TPH), carcinogenic polycyclic aromatic hydrocarbons (c-PAHs), and several metals. These contaminants can be at concentrations high enough to be harmful to human health and the environment unless managed appropriately. The following tables provide a summary of some past test results.

Table 8.2: Typical TPH Levels in Street Sweeping and Catch Basin Solids

Reference	Street Sweeping (mg/kg)	Catch Basin Solid (mg/kg)
Snohomish County (1) (Landau, 1995)	390 - 4300	
King County (1) (Herrera, 1995)		123 - 11049 (Median 1036)
Snohomish County & Selected Cities (1) (W&H Pacific, 1994)	163 - 1500 (Median 760)	163 -1562 (Median 760)
City of Portland (2) (Bretsch, 2000)		MDL - 1830 (Median 208)
City of Seattle - Diesel Range (2) (Seattle Public Utilities and Herrera, 2009)	330 - 520	780 - 1700
City of Seattle - Motor Oil (2) (Seattle Public Utilities and Herrera, 2009)	2000 - 2800	3500 - 7000
Oregon (1) (Collins, 1998)	1600 - 2380	
Oregon (3) (Collins, 1998)	98 - 125	
(1) Method WTPH 418.1; does not incorporate new methods to reduce background interference due to vegetative material (2) Method NWTPH-Dx (3) Method WTPH - HCID		

Table 8.3: Typical c-PAH Values in Street Waste Solids and Related Materials

Sample Source	City of Everett					WSDOT	
Analyte	**Street Sweepings**	**Soil**	**3-Way Topsoil**	**Vactor Solids**	**Leaf & Sand**	**Sweepings - Fresh**	**Sweepings - Weathered**
Benzo (a)anthracene	0.1U	0.076U	0.074U	0.21	0.45	0.56	0.40
Chrysene	0.14	0.09	0.074U	0.32	0.53	0.35	0.35
Benzo(b)fluor-anthene	0.11	0.076U	0.074U	0.27	0.52	0.43	0.51
Benzo(k)fluor-anthene	0.13	0.076U	0.074U	0.25	0.38	0.39	0.40
Benzo (a)pyrene	0.13	0.076U	0.074U	0.26	0.5	0.41	0.33U
Indeno(1,2,3-cd)pyrene	0.1U	0.076U	0.074U	0.19	0.39	NR	NR
Dibenzo(a,h)an-thracene	0.1U	0.076U	0.074U	0.081	0.12	0.39	0.33U
Revised MTCA Benzo (a)pyrene [ND=PQL]	0.215	0.134	0.134	0.388	0.727	0.708	0.597
Benzo (a)pyrene [ND = 1/2 PQL]	0.185	0.069	0.067	0.388	0.727	0.708	0.366
Benzo (a)pyrene [See * below]	0.185	0.069	0	0.388	0.727	0.708	0.366
Benzo (a)pyrene [ND = 0]	0.155	0.001	0	0.388	0.727	0.708	0.135

* If the analyte was not detected for any PAH, then ND=0; If analyte was detected in at least 1 PAH, then ND=1/2PQL; If the average concentration (using ND=1/2 PQL) is greater than the maximum detected value, then ND=Maximum value.

Table 8.4: Typical Metals Concentrations in Catch Basin Sediments

PARAMETER	Ecology 1993	Thurston 1993	King County 1995	King county 1995	City of Seattle 2003 through 2011
Metals: Total (mg/kg)	(Min - Max)	(Min - Max)	(Min - Max)	Mean	Min - Max (Mean)
As	< 3 - 24	.39 - 5.4	4 -56	0.250	<5 - 50 (9.3)
Cd	0.5 - 2.0	< 0.22 - 4.9	0.2 - 5.0	0.5	
Cr	19 - 241	5.9 - 71	13 - 100	25.8	
Cu	18 - 560	25 - 110	12 - 730	29	9.1 - 3,280 (166)
Pb	24 - 194	42 - 640	4 - 850	80	3 - 3,690 (154)
Ni	33 - 86	23 - 51	14 - 41	23	
Zn	90 - 558	97 - 580	50 - 2000	130	44 - 4170 (479)
Hg	0.04 - 0.16	0.24 - 0.193			<0.03 - 3.8 (0.16)

Table 8.5: Pollutants in Catch Basin Solids - Comparison to Dangerous Waste Criteria

PARAMETER	Range of Values in Catch Basin Waste	Range of Values in Catch Basin Waste	Dangerous Waste Criteria
METALS	Total Metals (mg/kg)	TCLP Metals (mg/kg)	TCLP values (mg/l)
As	<3 - 56	< 0.02 - 0.5	5.0
Cd	< 0.22 - 5	0.0002 - 0.03	1.0
Cr	5.9 - 241	0.0025 - 0.1	5.0
Cu	12 - 730	0.002 - 0.88	none
Pb	4 - 850	0.015 - 3.8	5.0
Ni	23 - 86	< 0.01 - 0.36	none
Zn	50 - 2,000	0.04 - 6.7	none
Hg	0.02 - 0.19	0.0001 - 0.0002	0.2
Data from (Thurston County, 1993), (Herrera, 1995) and (Serdar, 1993)			

8.B.4 Street Waste Liquids

General Procedures

Street waste collection should emphasize retention of solids in preference to liquids. Street waste solids are the principal objective in street waste collection and are substantially easier to store and treat than liquids.

Street waste liquids require treatment before their discharge. Street waste liquids, which include eductor and street sweeping truck decant and drainage from piles and containers, usually contain high amounts of suspended and total solids and adsorbed metals. Treatment requirements depend on the discharge location.

The entity responsible for operation and maintenance of the system must approve discharges to sanitary sewer and storm sewer systems. Ecology will not generally require waste discharge permits for discharge of stormwater decant to sanitary sewers or to stormwater treatment BMPs constructed and maintained in accordance with this manual.

Listed below is the required order of preference for disposal of liquid from collection of Street Wastes.

1. **Discharge of Street Waste liquids to a municipal sanitary sewer connected to a Public Owned Treatment Works (POTW).** Discharge to a municipal sanitary sewer requires the approval of the sewer authority. Approvals for discharge to a POTW will likely contain pretreatment, quantity, and location conditions to protect the POTW. Following the local sewer authority's conditions is a permit requirement.
2. **Discharge of Street Waste liquids may be allowed into a Basic or Enhanced Runoff Treatment BMP, if option 1 is not available.** Only discharge street waste liquid into the storm sewer system under the following conditions:
    - The preferred disposal option of discharge to sanitary sewer is not reasonably available.
    - The discharge is to a Basic or Enhanced Runoff Treatment BMP. If pretreatment does not remove visible sheen from oils, the Runoff Treatment BMP must be able to prevent the discharge of oils causing a visible sheen.
    - The discharge from the eductor truck is as near to the inlet of the Runoff Treatment BMP as practical, to minimize contamination or recontamination of the collection system.
    - The storm sewer system owner/operator has granted approval and has determined that the Runoff Treatment BMP will accommodate the increased loading. Part of the approval process may include pretreatment conditions to protect the Runoff Treatment BMP. Following local pretreatment conditions is a requirement of this permit.
    - Ecology must approve in advance flocculants for the pretreatment of street waste liquids. The liquids must be non-toxic under the circumstances of use.

    The discharger shall determine if reasonable availability of sanitary sewer discharge exists, by evaluating such factors as distance, time of travel, load restrictions, and capacity of the Runoff Treatment BMP.
3. **Operators may return water removed from stormwater ponds, vaults, and oversized catch basins to the storm sewer system.** Stormwater ponds, vaults, and oversized catch basins contain substantial amounts of liquid, which hampers the collection of solids and poses problems in hauling the removed waste away from the site. Water removed from these facilities may be discharged back into the pond, vault, or catch basin provided:

- Operators may discharge clear water removed from a stormwater treatment structure directly to a down gradient cell of a treatment pond or into the storm sewer system.
- Turbid water may be discharged back into the structure it was removed from if the removed water has been stored in a clean container (eductor truck, Baker tank, or other appropriate container used specifically for handling stormwater or clean water); and there will be no discharge from the treatment structure for at least 24 hours.
- The storm sewer system owner/operator must approve the discharge.

Table 8.6: Typical Street Waste Decant Values Compared to Surface Water Quality Criteria

PARAMETER	State Surface Water Quality Criteria		Range of Values Reported	
METALS	Freshwater Acute (ug/l - dissolved metals)	Freshwater Chronic (ug/l - dissolved metals)	Total Metals (ug/l)	Dissolved Metals (ug/l)
Arsenic	360	190	100 - 43,000	60 - 100
Cadmium*	2.73	0.84	64 - 2,400	2 - 5
Chromium (total)			13 - 90,000	3 - 6
Chromium (III)*	435	141		
Chromium (VI)	0.5	10		
Copper*	13.04	8.92	81 - 200,000	3 - 66
Lead*	47.3	1.85	255 - 230,000	1 - 50
Nickel*	1114	124	40 - 330	20 - 80
Zinc*	90.1	82.3	401 - 440,000	1,900 - 61,000
Mercury	2.10	0.012	0.5 - 21.9	
**Hardness dependent; hardness assumed to be 75 mg/L*				

Table 8.7: Typical Values for Conventional Pollutants in Street Waste Decant

PARAMETER	Ecology 1993	(Min - Max)	King County 1995	(Min - Max)
Values as mg/l; except where stated	Mean		Mean	
pH	6.94	6.18 - 7.98	8	6.18 - 11.25
Conductivity (umhos/cm)	364	184 - 1,110	480	129 - 10,100
Hardness (mg/l CaCO3)	234	73 - 762		
Fecal Coliform (MPN/100 ml)	3,000			
BOD	151	28 - 1,250		
COD	900	120 - 26,900		
Oil & Grease	11	7.0 - 40	471	15 - 6,242
TOC	136	49 - 7,880	3,670	203 - 30,185
Total Solids	1,930	586 - 70,400		
Total Dissolved Solids	212	95 - 550		
Total Suspended Solids	2,960	265 - 111,000		
Settleable Solids (ml/l/hr)	27	2 - 234	57	1 - 740
Turbidity (ntu)	1,000	55 - 52,000	4,673	43 - 78,000

Table 8.8: Street Waste Decant Values Following Settling

PARAMETER; Total Metals in mg/l	Portland - Inverness Site Min - Max	King County - Renton Min - Max	METRO Pretreatment Discharge Limits
Arsenic	0.0027 - 0.015	< MDL - 0.12	4
Cadmium	0.0009 - 0.0150	< MDL - 0.11	0.6
Chromium	0.0046 - 0.0980	0.017 - 0.189	5
Copper	0.015 - 0.8600	0.0501 - 0.408	8
Lead	0.050 - 6.60	0.152 - 2.83	4
Nickel	0.0052 - 0.10	0.056 - 0.187	5
Silver	0.0003 - 0.010	< MDL	3
Zinc	0.130 - 1.90	0.152 - 3.10	10

Table 8.8: Street Waste Decant Values Following Settling (continued)

PARAMETER; Total Metals in mg/l	Portland - Inverness Site Min - Max	King County - Renton Min - Max	METRO Pretreatment Discharge Limits
Settleable Solids; ml/L	No Data	0.02 - 2.0	7
Nonpolar FOG	5.7 - 25	5 - 22	100
Ph (std)	6.1 - 7.2	6.74 - 8.26	5.0 - 12.0
TSS	2.8 - 1310		
Recorded Total Monthly Flow; Gallons	Data not available	31,850 - 111,050	
Recorded Max. Daily Flow; Gallons	Data not available	4,500 - 18,600	25,000 GPD
Calculated Average Daily Flow; GPD	Data not available	1,517 - 5,428	
1) Data from King County's Renton Facility (data from 1998 - 1999) and the City of Portland's Inverness Site (data from 1999 - 2001); detention times not provided			

8.B.5 Collection Site Assessment

Ecology suggests a collection site assessment to identify spills or locations that potentially contain dangerous wastes.

The collection site assessment will aid in determining if waste is a dangerous waste and in deciding what to test for if dangerous waste is suspected. The collection site assessment will also help determine if the waste meets the requirements of the receiving facility.

There are three steps to a collection site assessment:

1. A **historical review** of the site for spills, previous contamination and nearby cleanup sites or dangerous waste facilities.

   The historical review will be easier if done on an area wide basis prior to scheduling any waste collection. The historical review should be more thorough for operators who have never collected waste at the site before. At a minimum, the historical review should include operator knowledge of the area's collection history or records from previous waste collections.

   Private operators should ask the owner of the site for records of previous contamination and the timing of the most recent cleaning. Ecology's Hazardous Substance Information Office maintains a Toxic Release Inventory and a Facility/Site Database, tracking more than 15,000 sites.

   Ecology's online Facility/Site Database is available at www.ecy.wa.gov/fs/.

   The database allows anyone with web-access to search for facility information by address, facility name, town, zip code, and SIC code, etc. It lists why Ecology is tracking each one (NPDES, TSCA, RCRA, Clean Air Act, etc.), as well as who to call within Ecology to find out

more about the given facility. EPA's toxic release website is http://i-aspub.epa.gov/triexplorer/tri_release.chemical

2. A **visual inspection** for potential contaminant sources such as a past fire, leaking tanks and electrical transformers, and surface stains.

   Take a look at the area for contaminant sources prior to collection of the waste. If the inspection finds a potential contaminant source, delay the waste collection until the potential contaminant is assessed.

   A second portion of the visual inspection is a good housekeeping assessment of the area. Locations with poor housekeeping commonly cut corners in less obvious places. Inspect these sites in greater detail for illegal dumping and other contamination spreading practices.

3. **Sweeping route, catch basin, waste, and container inspection** before and during collection.

   The inspection of the waste and catch basin or vault is the last and perhaps most critical step in the collection site assessment.

   For example, if the stormwater facility has an unusual color in or around it, then it is possible someone dumped something near it or into it. Some colors to be particularly wary of are yellow/green from antifreeze dumping and black and rainbow sheen from oil and/or grease dumping. In addition, if the inspector observes any staining or corrosion, then a solvent may have been dumped.

   Fumes are also good indicators of potential contamination. Avoid deliberate smelling of catch basins for worker safety, but suspicious odors may be encountered from catch basins thought to be safe. Some suspicious odors are rotten eggs (hydrogen sulfide is present), gasoline or diesel fumes, or solvent odors. If unusual odors are noted, contact a dangerous waste inspector before cleaning the basin.

   Finally, operator experience is the best guide to avoid collection of contaminated waste.

APPENDIX C

PILES USED FOR STORAGE OR TREATMENT
WAC 173-350-320

PILES USED FOR STORAGE OR TREATMENT

Checklist for Review of Solid Waste Permit Application
per WAC 173-350-320

Name of Applicant:	Name of Facility:
Permit # assigned by Health Department:	Date Received:
Lead Agency Reviewer Name: Phone: Signature:	Determination of Compliance with: The Site or Facility: ☐ meets all solid waste, air and other applicable laws and regulations ☐ conforms with the approved comprehensive solid waste handling plan ☐ complies with zoning requirements (JHD only)

☐ **Location requirements** *WAC 173-350-320(2)*	**Location of material**	**Complete**	**Meets Requirements**	**Date & Initials of Reviewer)**
There are no specific location standards for piles subject to this chapter; however waste piles must meet the requirements provided under WAC 173-350-040(5).		☐	☐	
Agency Comments:				

☐ **Design Standards** *WAC 173-350-320(3)*	**Location of material**	**Complete**	**Meets Requirements**	**Date & Initials of Reviewer)**
Maximum waste capacity, elevation and boundaries of the waste pile are provided.		☐	☐	
All piles shall be designed to:				
• Control public access		☐	☐	
• Comply with the uniform fire code as implemented through the local fire control agency		☐	☐	
• Minimize vector harborage to the extent practicable		☐	☐	
• Provide all-weather approach roads and exits		☐	☐	
Piles of putrescible waste, contaminated soils or dredged material, or waste determined by the jurisdictional health department to be likely to produce leachate posing a threat to human health or the environment shall also:				

• Place waste on a sealed surface, such as concrete or asphaltic concrete, to prevent soil and ground water contamination. The surface shall be durable enough to withstand material handling practices		☐	☐	
• JHD approved other types of surfaces, such as engineered soil **NA ☐**		☐	☐	
• include an analysis of the surface under the stresses expected during operations		☐	☐	
• include the design of the surface water management systems including run-on prevention and runoff conveyance, storage, and treatment		☐	☐	
• Control run-on and runoff from a twenty-five-year storm, as defined in WAC 173-350-100		☐	☐	
Agency Comments:				

☐ Plan of operations ***WAC 173-350-320(4)(e)***	**Location of material**	**Complete**	**Meets Requirements**	**Date & Initials of Reviewer)**
Describes the types of solid wastes to be handled at the facility (4)(e)(i)		☐	☐	
Describes how solid wastes are to be handled on-site during the facility's life including (4)(e)(ii)		☐	☐	
• The maximum amount of waste to be stored or treated in pile(s) at the facility		☐	☐	
• Methods of adding and removing waste from the pile and equipment used		☐	☐	
Describes how equipment, structures and other systems are to be inspected and maintained, including the frequency of inspection and inspection logs (4)(e)(iii)		☐	☐	
Safety and emergency plans (4)(e)(iv)		☐	☐	
Forms used to record volumes or weights (4)(e)(v)		☐	☐	
Other such details to demonstrate that the facility will be operated in accordance with subsection 4(a) – (d) & (f) and as required by the JHD (4)(e)(vi)		☐	☐	
Additional elements for contaminated soils & dredged material (4)(f)(iii)		☐	☐	
• A description of contaminants and concentrations (4)(f)(iii)(A)		☐	☐	
• Sampling and analysis plan used to characterize soils & dredged material (4)(f)(iii)(B)		☐	☐	
• Forms used to record source, characterization, and final disposition (4)(f)(iii)(C)		☐	☐	

Agency Comments:

☐ **Ground Water Monitoring Requirements *WAC 173-350-320(5)***	**Location of material**	**Complete**	**Meets Requirements**	**Date & Initials of Reviewer)**
There are no specific ground water monitoring requirements for piles subject to this chapter; however, waste piles must meet the requirements provided under WAC 173-350-040(5)		☐	☐	

Agency Comments:

☐ **Closure plan** ***WAC 173-350-320(6)(b)***	**Location of material**	**Complete**	**Meets Requirements**	**Date & Initials of Reviewer)**
Methods of removing wastes		☐	☐	
Steps taken for decontamination		☐	☐	

Agency Comments:

☐ **Financial Assurance Requirements WAC 173-350-*320(7)***	**Location of material**	**Complete**	**Meets Requirements**	**Date & Initials of Reviewer)**
There are no specific financial assurance requirements for piles subject to this chapter; however, waste piles must meet the requirements provided under WAC 173-350-040(5)		☐	☐	

Agency Comments:

If you require this publication in an alternate format, please contact the Solid Waste & Financial Assistance Program at 360-407-6900. For persons with a speech or hearing impairment call 711 for relay service or 800-833-6388 for TTY.