Stormwater Maintenance and Source Control Plan

PREPARED FOR:

Mr. Don Huber
SPP Manufacturing
PO Box 64160
Tacoma, WA 98465

PROJECT:

Puyallup 2nd Street Apartments
XXX 2nd Street NE
Puyallup, Washington
2190606.10

PREPARED BY:

Allyson Burket
Project Engineer

REVIEWED BY:

J. Matthew Weber, PE
Principal

DATE:

December 2021
Revised February 2024

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02/08/2024

I hereby state that this Stormwater Maintenance and Source Control Plan for Puyallup 2nd Street Apartments has been prepared by me or under my supervision and meets the standard of care and expertise that is usual and customary in this community for professional engineers. I understand that City Puyallup does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

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1.0 Project Description

The 2nd Street Apartments project in Puyallup, referred to herein as the "project site" or "site", is located northeast of the intersection of 2nd Street NE and 5th Avenue NE on Tax Parcel 7600200051 and is located within the Northwest Quadrant of the Northwest Quadrant of Section 27, Township 20 North, Range 4 East, Willamette Meridian, within the city limits of Puyallup, Washington. The project is bounded to the north by an auto sales lot and a single-family residence, and to the east by a single-family residence and an apartment building. Access will be provided from 5th Avenue NE and 2nd Street NE. The site is currently zoned as central business district (CBD). Refer to Exhibit C-1 for a Vicinity Map.

The project proposes three apartment buildings with a collective footprint of approximately 7,600 square feet. Other improvements will include driveways, site paving, landscaping, and improvements to the adjacent right-of-way. Proposed utilities include storm drainage, a sanitary sewer connection, and a water system.

This report presents a maintenance program that meet the requirements of the 2021 Pierce County *Stormwater Management and Site Development Manual (SMSDM)*. This document provides the guidelines for facilities to be maintained in a timely and conscientious manner. If the stormwater facilities and conveyance systems are not adequately inspected and maintained periodically, it could lead to local flooding and increased erosion potential. Siltation, debris, or lack of general maintenance can reduce the performance capabilities of the facilities.

2.0 Maintenance Importance and Intent

The importance of maintenance for the proper functioning of stormwater control facilities cannot be overemphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) are due to inadequate maintenance. Stormwater Best Management Practice (BMP) maintenance is essential to ensure that BMPs function as intended throughout their life cycle.

The fundamental goals of maintenance activities are to ensure the entire flow regime and treatment train designed for this site continue to fully function. For this site, these include:

- Maintain designed stormwater infiltration capacity.
- Maintain ability to safely convey design stormwater flows.
- Maintain ability to treat stormwater runoff quality.
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems.
- Clearly identify systems so they can be protected.
- Keep maintenance costs low.
- Prevent large-scale or expensive stormwater system failures.
- Prevent water quality violations or damage to downstream properties.

The intent of this section and manual is to pass on to the responsible parties all information critical to understanding the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost so that realistic budgets can be established.

3.0 Responsible Parties

This project includes a mix of public and private facilities. The permeable concrete sidewalk located within the right-of-way is to be dedicated to City of Puyallup to own and maintain. The private stormwater facilities within the site shall be owned and maintained by SPP Manufacturing's maintenance personnel.

Maintenance of the stormwater facilities shall follow the schedule as specified in the attached maintenance checklists and as recommended by the media filter manufacturer guidelines. Additional maintenance may be required to respond to unusual storm events or reduced performance of the treatment system. A copy of the Pierce County-recommended maintenance schedule is attached and may be photocopied and used as inspection records. An annual inspection report must be submitted to City of Puyallup in accordance with the Maintenance Agreement.

4.0 Facilities Requiring Maintenance

A system of catch basins and pipes will convey stormwater from the proposed parking lot to one of three Contech StormFilter units before it reaches the underground gravel infiltration trench. The apartment buildings' roof downspouts will drain directly to the trench. A 1-foot wide gravel ditch along the east property line will infiltrate runoff form the property's east landscape buffer.

5.0 Maintenance Instructions

The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining whether maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based on inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. For facilities not owned and maintained by the City, a log of maintenance activity that indicates what actions were taken must be kept onsite and be available for inspection by the City.

Maintenance should be conducted monthly from November through April, once in later summer (preferably September), and after any major storm event. Additional maintenance may be required to respond to unusual storm events or reduced performance of the facilities. A copy of the recommended maintenance schedule is included in Exhibit A and may be photocopied and used as inspection records. Inspection reports should be completed annually.

Routine inspection and maintenance apply to the following systems that are considered an integral part of the onsite stormwater and pollution prevention facilities:

- Catch Basins.
- Filter Cartridges.
- Gravel Trench.
- Roof Downspouts.
- Landscaping and Trees.

Exhibit A-1 contains a stormwater facility maintenance schedule. A maintenance guide for the storm filters is included in Exhibit A-2. Plan to complete a checklist for all system components per the following schedule:

- Monthly from November through April.
- Once in later summer (preferably September).
- After any major storm events.

Using photocopies of the attached pages, check off the problems that are noted each time the item is inspected. Document comments on problems found and the corrective action taken.

6.0 Vegetation Maintenance

The maintenance schedules in Exhibit A provide guidance on vegetation control and management within stormwater facilities and general ground maintenance. Irrigation and other maintenance, as necessary, shall be provided to ensure that vegetation remains viable and that a hardy root structure forms in the first year. Vegetation planting shall be provided as described in the construction documents.

7.0 Pollution Source Control Measures

Pollution source control is the application of pollution prevention practices on a developed site to reduce contamination of stormwater runoff at its source. Site-specific BMPs have been incorporated into the site plan to reduce contaminants used or discharged to the environment. Refer to Exhibit B for Source Control BMPs for Single-Family Residences.

This Stormwater Maintenance and Source Control Plan is developed for the operation of the Puyallup 2nd Street Apartments private stormwater systems. This maintenance document has been prepared within the guidelines of the City of Puyallup Construction Standards. If this plan is implemented, the owner can expect the stormwater system to function as designed.

AHBL, Inc.

Allyson Burket
Project Engineer

AB/lsk

December 2021
Revised February 2024

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Exhibit A

Maintenance Schedule

The site is located northeast of the intersection of 2nd Street NE and 5th Avenue NE in Puyallup, Washington.

The 2nd Street Apartments Plat proposes a permeable sidewalk along the building frontage to be managed and maintained by City of Puyallup. All other onsite stormwater improvements are to be the responsibility of SPP Manufacturing's maintenance personnel.

Table 1 below describes each stormwater facility, including what it does and how it works.

Table 1. Stormwater Facility Descriptions

Stormwater Facility	Description
Stormwater Drainage Manholes / Catch Basins	Manholes and catch basins collect stormwater from the site and are connected to the storm drainage pipes.
Roof Drain	Conveys roof runoff from downspouts to infiltration trench.
Infiltration Trench	Gravel-filled trench with underdrain provides temporary storage of stormwater runoff before gradually infiltrating into the surrounding soils.
Infiltration Ditch	Collects runoff and infiltrates into surrounding soils

Puyallup 2nd Street Apartments

Inspection Frequencies

Asset	Preferred Month	Interval
Storm Drainage Manholes / Catch Basins		Annually
Roof Drain		Annually
Infiltration Trench		Annually
Infiltration Ditch		Annually
Permeable Concrete Pavement		Annually
Landscaping	March through April September through October	Semi-annually

Puyallup 2nd Street Apartments

Maintenance Activity Log

DATE	FACILITY DEFECT OR PROBLEM	ACTION TAKEN	CONDITION AFTER MAINTENANCE

CONTECH®
ENGINEERED SOLUTIONS

StormFilter Inspection and Maintenance Procedures

The Stormwater Management StormFilter®

Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. **Inspection**
   - Inspection of the vault interior to determine the need for maintenance.
2. **Maintenance**
   - Cartridge replacement
   - Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/ maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..

Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit and the unit's role, relative to detention or retention facilities onsite.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered).

Please note Stormwater Management StormFilter devices installed downstream of, or integrated within, a stormwater storage facility typically have different operational parameters (i.e. draindown time). In these cases, the inspector must understand the relationship between the retention/detention facility and the treatment system by evaluating site specific civil engineering plans, or contacting the engineer of record, and make adjustments to the below guidance as necessary. Sediment deposition depths and patterns within the StormFilter are likely to be quite different compared to systems without upstream storage and therefore shouldn't be used exclusively to evaluate a need for maintenance.

1. Sediment loading on the vault floor.
   a. If >4" of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
   a. If >1/4" of accumulation, maintenance is required.
3. Submerged cartridges.
   a. If >4" of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
   a. While not required in all cases, inspection of the media within the cartridge may provide valuable additional information.
   b. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
   a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
   a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
   a. If pronounced scum line (say ≥ 1/4" thick) is present above top cap, maintenance is required.

Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

   Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

B. Remove the used cartridges (up to 250 lbs. each) from the vault.

Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

C. Set the used cartridge aside or load onto the hauling truck.

D. Continue steps a through c until all cartridges have been removed.

Method 2:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

B. Unscrew the cartridge cap.

C. Remove the cartridge hood and float.

D. At location under structure access, tip the cartridge on its side.

E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.

F. Set the empty, used cartridge aside or load onto the hauling truck.

G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

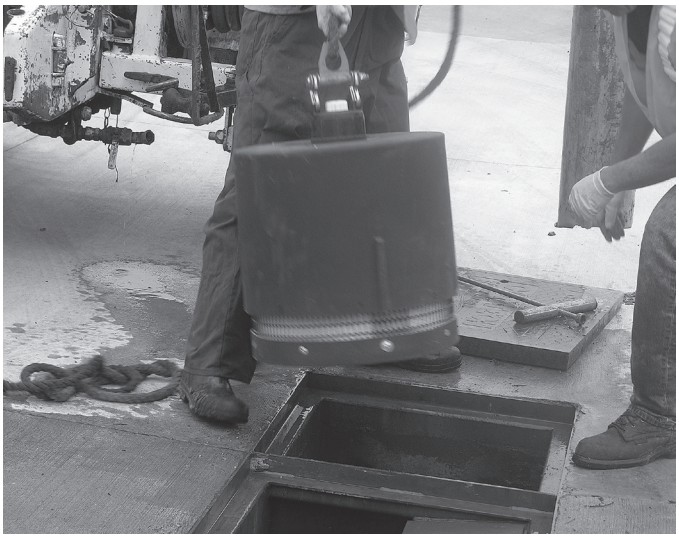
Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.



Inspection Report

Date: _____ Personnel: _____

Location: _____ System Size: _____ Months in Service: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other: _____

Sediment Thickness in Forebay: _____ Date: _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water: _____

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal: _____

☐ Minor Structural Repairs: _____

☐ Drainage Area Report _____

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

Items Needing Further Work: _____

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other: _____

List Safety Procedures and Equipment Used: _____

_____

_____

System Observations

Months in Service: _____

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: _____

Replace Cartridges: Yes ☐ No ☐ Details: _____

Sediment Removed: Yes ☐ No ☐ Details: _____

Quantity of Sediment Removed (estimate?):

Minor Structural Repairs: Yes ☐ No ☐ Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:

_____

_____

_____

_____

_____

_____

_____

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Support

- Drawings and specifications are available at www.conteches.com.
- Site-specific design support is available from our engineers.

Exhibit B

Source Control BMPs

Chapter 3. Best Management Practices for Single-Family Residences

The actions we take each day in and around our homes have a profound effect on surface water quality and fish habitat in this region. Stormwater drains directly to our rivers, lakes, streams, groundwater, and to Puget Sound. It does not go to the wastewater treatment plant. Any pollutants that get into the stormwater go directly to surface waters or groundwater. Small amounts of pollution from many different sources can significantly affect our waterways. Yard maintenance, waste storage, car washing and maintenance, and pool cleaning are activities that adversely impact water quality. The BMPs discussed in this section are practical ways to keep stormwater from becoming polluted. It is recommended all residents in Pierce County use these BMPs. **Please note some of these procedures are required by various state, or county laws, and are noted as required BMPs.**

Below is a general list of BMPs for citizens. The list includes brief information on applicability. For more information on the following BMPs, refer to the information in Sections 3.1 through 3.10 of this chapter. Additionally, BMPs addressing roof runoff systems and LID features are presented in Volume III, Volume V, and Volume VI.

3.1 Automobile Washing

Most residents wash their cars in the driveway or on the street. Washwaters typically flow to a storm drain or ditch, which discharges stormwater directly to the nearest river, stream, lake, or Puget Sound. Soaps and detergents, even the biodegradable ones, can have immediate and long-term effects on organisms living in water bodies. Grime washed off the car also contains a variety of pollutants that can harm fish and wildlife.

3.1.1 Suggested BMPs

Away from Home (preferred option):

- Consider not washing your car at home. Take it to a commercial car wash that has a recycle system and discharges wastewater to the sanitary sewer for treatment.

At Home:

- Wash your car directly over your lawn or make sure the washwater drains to a vegetated area. This allows the water and soap to soak into the ground instead of running off into a local water body.
- Ideally, no soaps or detergents should be used, but if you do use one, select one without phosphates.
- Commercial products are available that allow you to clean a vehicle without water. These were developed for areas where water is scarce, so a water saving benefit is realized, as well as reduced pollution.
- Use a hose nozzle with a shut-off valve to save water.
- Do not wash your car if rain is expected. Rain events will rapidly wash chemicals and cleaning products from your property into the stormwater system (and to downstream waters).
- Pour the bucket of soapy, dirty washwater down your sink. This way the water doesn't pollute surface water. Instead, it's treated at the wastewater treatment plant.

3.2 Automobile Maintenance

We enjoy the cost savings of changing our own oil, antifreeze, topping off the battery with water, and generally making our car perform its' best. There is a lot of potential for stormwater pollution associated with these activities; however, the following BMPs will help you minimize pollution while servicing your car.

3.2.1 Required BMPs

- Recycle all oils, antifreeze, solvents, and batteries. Many local car parts dealers and gas stations accept used oil. The Household Hazardous Waste facilities at the Tacoma Landfill or LRI Landfill accept oil, oil filters, antifreeze, and solvents. Pierce County and Tacoma also hold Household Hazardous Waste turn-in days that will accept car wastes including old batteries. Old batteries can actually be worth money. Search for local battery recycling businesses to find out if any offer to buy used batteries. Use the numbers listed in Chapter 7 for more information.
- Never dump new or used automotive fluids or solvents on the ground, in a storm drain or street gutter, or in a water body. Eventually, it will make its way to local surface waters or groundwater, including the water we drink.
- Do not mix wastes. The chlorinated solvents in some carburetor cleaners can contaminate a huge tank of used oil, rendering it unsuitable for recycling. Always keep your wastes in separate containers which are properly labeled and store them out of the weather.

3.2.2 Suggested BMPs

- Fix all leaks, to keep the leaky material off streets and out of surface water.
- To dispose of oil filters, punch a hole in the top and let drain for 24 hours. This is where a large funnel in the top of your oil storage container will come in handy. After draining, wrap in 2 layers of plastic and dispose of in your regular garbage or recycle by taking it to the Tacoma Landfill or LRI Landfill Household Hazardous Waste facility for Tacoma residents and non-residents. Call the Hazardous Waste line at 18002876429 for up-to-date information on the appropriate disposal of consumer products.
- Use care in draining and collecting antifreeze to prevent accidental spills. Spilled antifreeze can be deadly to cats and dogs that ingest it.
- Perform your service activities on concrete or asphalt or over a plastic tarpaulin to make spill cleanup easier. Keep a bag of kitty litter on hand to absorb spills. If there is a spill, sprinkle a good layer on the spill, let it absorb for a little while and then sweep it up. Place the contaminated litter in a plastic bag, tie it up, and dispose of it in your regular garbage. Take care not to leave kitty litter out in the rain; it will form a sticky sludge that is hard to clean up.
- If you are doing body work outside, be sure to use a tarpaulin to catch material resulting from grinding, sanding, and painting. Dispose of this waste by double bagging in plastic and placing in your garbage.

3.3 Storage of Solid Wastes and Yard Wastes

Improper storage of recycling, yard waste, and trash at residences can lead not only to water pollution problems, but problems with neighborhood pets and vermin. Following the BMPs listed

below can help keep your property a clean and healthy place to live.

3.3.1 Suggested BMPs

All recycling and waste containers kept outside should have lids (Figure 3.1). If your lid is damaged, you should repair or replace it as soon as possible. If your container is supplied by your hauler, please call to have the lid repaired or replaced. Find your hauler's contact information at piercecountywa.gov/recycle.

- Leaking containers should be replaced. If your container is supplied by your hauler, contact the hauler to have damaged containers replaced.
- Store containers under cover if possible, or on grassy areas.
- Inspect the storage area regularly to pick up loose scraps of material and dispose of them properly.
- Tips for reducing waste:
  - Recycle as much as you can. Most Pierce County residents have access to curbside pickup for yard waste and recyclable materials. Use the online recycling menu to find more recycling options.
  - Purchase products with the least amount of packaging materials.

Figure 3.1. - Recycling Cart with Properly Sealed Lid.

  - Compost biodegradable materials such as grass clippings and vegetable scraps instead of throwing them away. Your flowerbeds will love the finished compost, and you will be helping to conserve limited landfill space. Visit piercecountywa.gov/compost or call Pierce County Planning and Public Works at (253) 798-2179 for more information on composting or yard waste collection. See the section on composting for BMPs relating to that activity.

- A fun alternative to traditional composting is worm composting. You can let worms do all the work for you by keeping a small vermiculture box just outside your kitchen. For more information on getting started with worms, visit piercecountywa.gov/compost or call the number listed above.

3.4 Composting

Composting is an earth-friendly activity. If you choose to compost, the following BMPs should be utilized. More information can be found online at piercecountywa.gov/compost.

3.4.1 Suggested BMPs

- Compost piles must be located on an unpaved area where runoff can soak into the ground or be filtered by grass and other vegetation. Compost piles should be located in an area of your yard not prone to water ponding during storms, and should be kept well away from wetlands, streams, lakes, and other drainage paths.
- Compost piles must be maintained and turned over regularly to work properly. Large piles of unattended compost may create odor and vermin problems.
- Avoid putting hazardous, inorganic, plastics or metal waste in the pile.
- Cover the compost pile (Figure 3.2) for two reasons:
  1. To keep stormwater from washing nutrients into waterways.
  2. To keep excess water from cooling down the pile, which will slow down the rate of decomposition.

Figure 3.2. - Covered Compost Bin.

(photo courtesy of Green Culture)

Build Bins of wood, chicken wire, or fencing material to contain compost so it cannot be washed away. Visit piercecountywa.gov/compost to download plans for building your own bin, or call Pierce County Planning and Public Works at (253) 798-2179.

- Building a small earthen dike around your compost pile is an effective means of preventing nutrient-rich compost drainage from reaching stormwater paths.

3.5 Yard Maintenance and Gardening

This section discusses normal yard maintenance activities we all perform at our homes. Overwatering, overfertilizing, improper herbicide application, and improper disposal of trimmings and clippings can all contribute to serious water pollution problems. Following the BMPs listed below will help alleviate pollutant runoff.

3.5.1 Required BMPs

- Follow the manufacturer's directions exactly for mixing and applying herbicides, fungicides, and pesticides, and use them sparingly. Never apply when it is windy or when rain is expected. Never apply over water, within 100 feet of a well-head, or adjacent to streams, wetlands, or other water bodies. Triple-rinse empty containers, using the rinsate for mixing your next batch of spray, and then double-bag and dispose of the empty container in your regular garbage. Never dispose of grass clippings or other vegetation in or near storm drains, streams, lakes, or Puget Sound.

3.5.2 Suggested BMPs

- Use natural, organic soil amendments like Pierce County's SoundGRO Mix. SoundGRO Mix is a 100 percent recycled blend of dewatered, Class A, "Exceptional Quality" biosolids, mixed with sawdust and sand. The excellent soil conditioning properties of the organic matter aid water retention in lighter soils and help to break up and aerate heavier soils, so roots can grow better and less watering is needed. It contains both readily available and long term nitrogen and other nutrients commonly lacking in Northwest soils. The slow release of nitrogen better matches the needs of plants. Thus, there is much less potential for nitrates to leach into surface or groundwater due both to less "excess nitrogen" and less water use. Better vegetative growth can also reduce erosion and runoff.
- Follow manufacturer's directions when applying fertilizers. More is not better, either for your lawn or for local water bodies. Never apply fertilizers over water or adjacent to ditches, streams, or other water bodies. Remember that organic fertilizers have a slow release of nitrogen, and less potential to pollute then synthetic fertilizers.
- Save water and prevent pollution problems by watering your lawn sensibly. Lawns and gardens typically need the equivalent of 1-inch of rainfall per week. You can check on how you're doing by putting a wide mouth jar out where you're sprinkling, and measure the water with a small plastic ruler. Overwatering to the point of runoff can carry polluting nutrients to the nearest water body.
- Consider planting a vegetated buffer zone adjacent to streams or other water bodies on your property. Call the Pierce County Conservation District at (253) 8459770 for advice and assistance in developing a planting plan. The Stream Team at the Conservation District may even be able to help you plant it.
- Reduce the need for pesticides and fertilizers on lawns by improving the health of the soil. Aerating, thatching, and topdressing with compost or the City of Tacoma's Tagro products will improve soil health and help wanted grasses compete with weeds and moss.
- Make sure all fertilizers and pesticides are stored in a covered location. Rain can wash the

labels off of bottles and convert 50 pounds of fertilizer into either a solid lump or a river of nutrients.

- Use a mulching mower and mow higher to improve soil/grass health and reduce or eliminate pesticide use.
- Compost all yard clippings, or use them as mulch to save water and keep down weeds in your garden. See Composting section for more information.
- Practice organic gardening and virtually eliminate the need to use pesticides and fertilizers. Contact Pierce County Cooperative Extension at (253) 7987180 or the Ask-A-Master Gardener program at (253) 7987170 for information and classes on earth-friendly gardening.
- Pull weeds instead of spraying and get some healthy exercise, too. If you must spray, use the least toxic formulations that will get the job done. The Master Gardener program listed above can help advise you on which spray to use.
- Till fertilizers into the soil instead of letting them lie on the ground surface exposed to the next rain storm.
- Plant native vegetation which is suited to Northwest conditions, they require less water and little to no fertilizers and pesticides.
- Contact your local waste disposal company for curbside pickup and recycling of yard waste.

3.6 Swimming Pool and Spa Cleaning and Maintenance

This section discusses water from pools, spas, hot tubs and fountains chemically treated or heated. Nutrients, pH, and chlorine can adversely affect fish and wildlife in water bodies. Following these BMPs will ensure the cleanliness of your pool and the environment.

3.6.1 Required BMPs

- Do not discharge water directly from a pool spa, hot tub or fountain process wastes, or wastewaters into storm drains except if the discharge water is dechlorinated to 0.1 mg/L if it is to be emptied into a ditch or to the stormwater drainage system. Contact your pool chemical supplier to obtain the neutralizing chemicals you will need. The rate of flow into the ditch or stormwater drainage system must be regulated so that it does not cause problems such as erosion, surcharging, or flooding. Water discharged to the ground or a lawn must not cross property lines and must not produce runoff.
- If pool, spa, hot tub, or fountain water cannot be dechlorinated, it must be discharged to the sanitary sewer. Prior to draining, your local wastewater treatment plant must be notified to ensure they are aware of the volume of discharge and the potential effects of chlorine levels (call (253) 7983013). A pool service company can help you determine the frequency of cleaning and backwash of filters.
- Diatomaceous earth used in pool filters cannot be disposed of in surface waters, on the ground, or into stormwater drainage systems or septic systems. Dry it out as much as possible, bag it in plastic, and dispose of at the landfill.

3.6.2 Suggested BMPs

- Hire a professional pool service company to collect all pool water for proper disposal. Make

sure to ask them where they will dispose of it and the kind of permits they hold to do so.

- Ensure that the pool, spa, hot tub, or fountain system is free of leaks and operates within the design parameters.
- Do not provide any permanent links to drainage systems. All connections should be visible and carefully controlled.
- If the dechlorination or cooling process selected requires the water to be stored for a time, it should be contained within the pool or appropriate temporary storage container.

3.7 Household Hazardous Material Use, Storage, and Disposal

Once we really start looking around our houses, the amount of hazardous materials we have onsite is a real eye-opener. Oil-based paints and stains, paint thinner, gasoline, charcoal starter fluid, cleaners, waxes, pesticides, fingernail polish remover, and wood preservatives are just a few hazardous materials that most of us have around the house.

When products such as these are dumped on the ground or in a storm drain, they can be washed directly to receiving waters where they can harm fish and wildlife. They can also infiltrate into the ground and contaminate drinking water supplies. The same problem can occur if they are disposed of with your regular garbage; the containers can leak at the landfill and contaminate groundwater. The same type of contamination can also occur if hazardous products are poured down a sink or toilet into a septic system. Do not pour them down the drain if you're on municipal sewers, either. Many compounds can "pass through" the wastewater treatment plant without treatment and contaminate receiving waters, or they can harm the biological process used at the treatment plant, reducing overall treatment efficiency.

With such a diversity of hazardous products present in all homes in Pierce County, a large potential for serious environmental harm exists if improper methods of storage, usage, and disposal are employed. Using the following BMPs will help keep these materials out of our soils, sediments, and waters.

3.7.1 Required BMPs

- Hazardous Materials must be used in accordance with the manufacturer recommendation or guidelines as shown on the label.
- Always store hazardous materials in properly labeled containers, never in food or beverage containers which could be misinterpreted by a child as something to eat or drink.
- Dispose of hazardous materials and their containers properly. Never dump products labeled as poisonous, corrosive, caustic, flammable, inflammable, volatile, explosive danger, warning, caution, or dangerous outdoors, in a storm drain, or into sinks, toilets or drains. Visit piercecountywa.gov/hhw, call the Hazardous Waste Line at 1 (800) 287-6429, Tacoma-Pierce County Health Department (253) 798-6047, or the Tacoma Solid Waste Utility Household Hazardous Waste at (253) 591-5418 for information on disposal methods, collection events, and alternative products. Household hazardous waste from Pierce County residents and non-residents are accepted at the Tacoma Landfill and LRI Landfill.

3.7.2 Suggested BMPs

- Check hazardous material containers frequently for signs of leakage. If a container is rusty and has the potential of leaking soon, place it in a secondary container before the leak

occurs and prevent a cleanup problem.

- Hazardous materials should be stored out of the reach of children.
- Store hazardous materials containers under cover and off the ground. Keep them out of the weather to avoid rusting, freezing, cracking, labels being washed off, etc.
- Keep appropriate spill cleanup materials on hand. Kitty litter is good for many oil-based spills.
- Ground cloths and drip pans must be used under any work outdoors which involves hazardous materials such as oil-based paints, stains, rust removers, masonry cleaners, and others bearing label warnings as outlined above (Figure 3.3).

Figure 3.3. - Drip Pan for Capturing Spills and Drips During Engine Repair and Maintenance.

- Latex paints are not a hazardous waste, but are not accepted in liquid form at the landfill. To dispose of, leave uncovered in a protected place until dry, then place in the garbage. If you want to dry waste paint quickly, mix kitty litter or sawdust in the can to absorb the paint. Once paint is dry, leave the lid off when you place it in the garbage so your garbage collector can see that it is no longer liquid.
- Use less toxic products whenever possible. The Hazardous Waste Line at 1 (800) 287-6429 and the Washington Toxics Coalition at (206) 632-1545 have information detailing alternatives to toxic products.
- If an activity involving the use of a hazardous material can be moved indoors out of the weather, then do so. Make sure you can provide proper ventilation, however.
- Follow manufacturers' directions in the use of all materials. Over-application of yard chemicals, for instance, can result in the washing of these compounds into receiving water bodies. Never apply pesticides when rain is expected.
- When hazardous materials are in use, place the container inside a tub or bucket to minimize spills and store materials above the local base flood elevation (BFE).

3.8 Pet Waste Management

Pets and pet-care can generate pollutants from waste, animal washing and cage or kennel cleaning. Pet waste that washes into rivers, lakes, streams or Puget Sound begins to decay, using up oxygen and releasing ammonia. Low oxygen levels and ammonia combined with warm water can kill fish. Pet waste also contains nutrients that encourage weed and algae growth in waters we use for swimming, boating and fishing. Most importantly, pet waste can carry diseases and bacteria that could make water unsafe for contact and lead to beach closures or effect shellfish harvest. These include:

- Campylobacteriosis—bacterial infection
- Salmonellosis—bacterial infection
- Toxocariasis—roundworm infection
- Toxoplasmosis—protozoan parasite infection
- Giardiasis—protozoan parasite infection
- Fecal Coliform—bacteria in feces, indicates contamination
- *E. coli*—bacteria in feces, may cause disease.

Cleaning up after your pet can be as simple as taking a plastic bag or pooper scooper along on your next walk. Then choose one of the following:

3.8.1 Suggested BMPs for Pet Owners

- Regularly pick up and dispose of pet waste deposited on walks and at home.
- Put waste in a securely closed bag and deposit it in the trash. Do not put it in your yard waste container because pet waste may carry diseases, and yard waste treatment may not kill disease organisms.
- Do not compost or use pet waste as a fertilizer – Harmful bacteria, worms, and parasites that can transmit disease can live in the soil for years even after the solid portion of the pet waste has dissolved.
- Do not dispose of unused pet pharmaceuticals in a storm drain, in a toilet, or down a sink. Check with your local refuse collector for proper disposal locations of pet medications.
- When cleaning out cages and kennels, dispose of washwater down the toilet or a mop sink. Otherwise, wash directly over lawn areas or make sure the washwater drains to a vegetated area.
- Bathe pets indoors or in a manner that washwater won't be discharged to storm drains, ditches, or surface waters of the state.

Suggested BMPs for Recreation Areas and Multi-Family Properties

- Post signs at recreation areas and multi-family properties (that allow pets) reminding residents and visitors to pick up after their pets.
- Carefully consider the placement of pet waste stations at recreation sites and near multi-family properties that allow pets. Choose locations convenient for dog walkers to pick up a bag at the start of their walk and locations for them to dispose of it at mid-walk or at the end of their walk.
- Check pet waste stations on a regular basis to keep pet waste bags stocked and disposal stations empty. Consider signage to keep regular trash out of pet waste disposal stations to avoid filling them too quickly. Make sure pet waste disposal stations have a cover to keep out water.
- At multi-family properties with roof-top dog runs, ensure that stormwater from the dog run is not discharged to the stormwater system. Check with the local jurisdiction regarding roof-top dog run connections to sanitary sewer.

3.9 On-Site Sewage Maintenance and Operation

Pierce County is responsible for making sure stormwater discharged from the stormwater management systems do not harm or impair the receiving waters (streams, rivers, lakes, groundwater or Puget Sound) it discharges into. Sample tests of stormwater discharges and receiving water occasionally indicate high levels of fecal coliform bacteria.

One potential source of bacteria is malfunctioning onsite sewage systems (septic systems). Septic system failures have been documented on private property in Pierce County.

Septic systems vary widely in their design and complexity. Owners of septic systems should contact the Tacoma-Pierce County Health Department at (253) 7986577 to request an as-built of their system. As-builts are also available on their website at tpchd.org/healthy-homes/septic-systems.

A septic tank is the first stage of a private sewage disposal system, and is a water-tight tank placed below ground, usually made from concrete, fiberglass, plastic or steel. Septic tanks have one or two access ports for inspection and maintenance which are usually buried a few inches below the ground.

The tank receives household wastewater through an inlet pipe at one end, settles out larger material to the bottom, breaks down waste material with bacteria present in the tank and delivers the partially treated wastewater out another pipe on the opposite end of the tank to the disposal field.

The disposal field is the second stage of the private sewage disposal system and completes the final breakdown of wastewater with organisms in the soil.

The disposal field (drainfield) consists of narrow trenches filled with gravel and perforated pipes that distribute the wastewater to the field. With proper maintenance, a well-designed system can last a long time; however, disposal fields will clog if forced to handle large particles that should settle out in the bottom of the septic tank.

3.9.1 Required BMPs

Regular Inspection and Maintenance

Owners of septic systems must follow all of the requirements of the Tacoma- Pierce County Health Department (Health Department). Septic systems are required to be inspected on a routine basis. The frequency of inspection is based on the type of septic system being used and is outlined in the Tacoma-Pierce County Board of Health Resolution No. 2014-4414, Environmental Health Chapter 2 Code, Section 39 through 42. For "high risk" systems the inspections are required annually. Septic system noted as "moderate risk" should be inspected every three years. Those systems classified as "low risk" are to be inspected at time of property sale, land development or upon notification by the Health Department.

The inspection should cover each component of the septic system from the septic tank through the final disposal field. Measuring accumulated sludge and scum in the septic tank is an important part of the overall inspection process. Pumping frequency of the septic tank can vary depending on tank size, family size and garbage disposal use. Inspection of the entire system and conducting needed maintenance can find and correct problems before they become major, thereby saving the homeowner in potential high repair cost. Contact the Tacoma-Pierce County Health Department at (253) 7984788 for further information and specific requirements applicable to your system.

Eliminate or Restrict Garbage Disposal Use

Eliminating or restricting garbage disposals can significantly reduce the loading of solids to the septic tank thus reducing the pumping frequency.

Reduce and Spread Water Use Out Over the Day

Septic systems are limited in their ability to handle large amounts of wastewater discharged at one time. Excessive wastewater flow can cause turbulence in the septic tank that may flush accumulated solids into the disposal field. Over time this will impair the ability of the disposal field to function. Limit water using appliances to one at a time. Do one load of clothes a day rather than several in one day. Practice water conservation at home.

Chemical Use

Septic systems are to be used for the disposal of household wastewater only. Never dispose of excess or unwanted chemicals into the septic system. Occasional use of household cleaners in accordance with the manufacturers' recommendations should not harm your septic system. Avoid using septic tank additives that advertise their use as septic system cleaners or a substitute for pumping.

For additional information on proper operation of your septic system or to report a failing septic system in your neighborhood, contact the Tacoma-Pierce County Health Department at (253) 649-1925 or at tpchd.org/healthy-homes/septic-systems.

3.10 Activities in Wetlands and Wetland Buffers

Wetlands and associated buffers are vegetated ecosystems through which water passes. These areas characteristically have a high water table and are often subject to periodic flooding. Wetlands can be very effective in removing sediments, nutrients and other pollutants from stormwater.

Maintaining wetlands and associated buffers helps to slow stormwater runoff, trap sediments and other pollutants and reduce the volume of runoff by allowing infiltration to occur. Reducing the velocity of runoff reduces soil erosion and increases contact time with soil and vegetation. Increasing contact of stormwater with soils and vegetation in a wetland or riparian area can be effective in removing sediments, nutrients and other pollutants from stormwater runoff.

Buffer areas are important to both the wetland and the upland areas as habitat for aquatic wetland-dependent wildlife and as buffers during extreme weather events. Other functions of buffer areas that contribute to water quality include shading, flood attenuation and shoreline stabilization.

Persons responsible for maintenance of wetland areas are encouraged to call Pierce County PPW at (253) 7983739 prior to performing work in wetlands or their buffers.

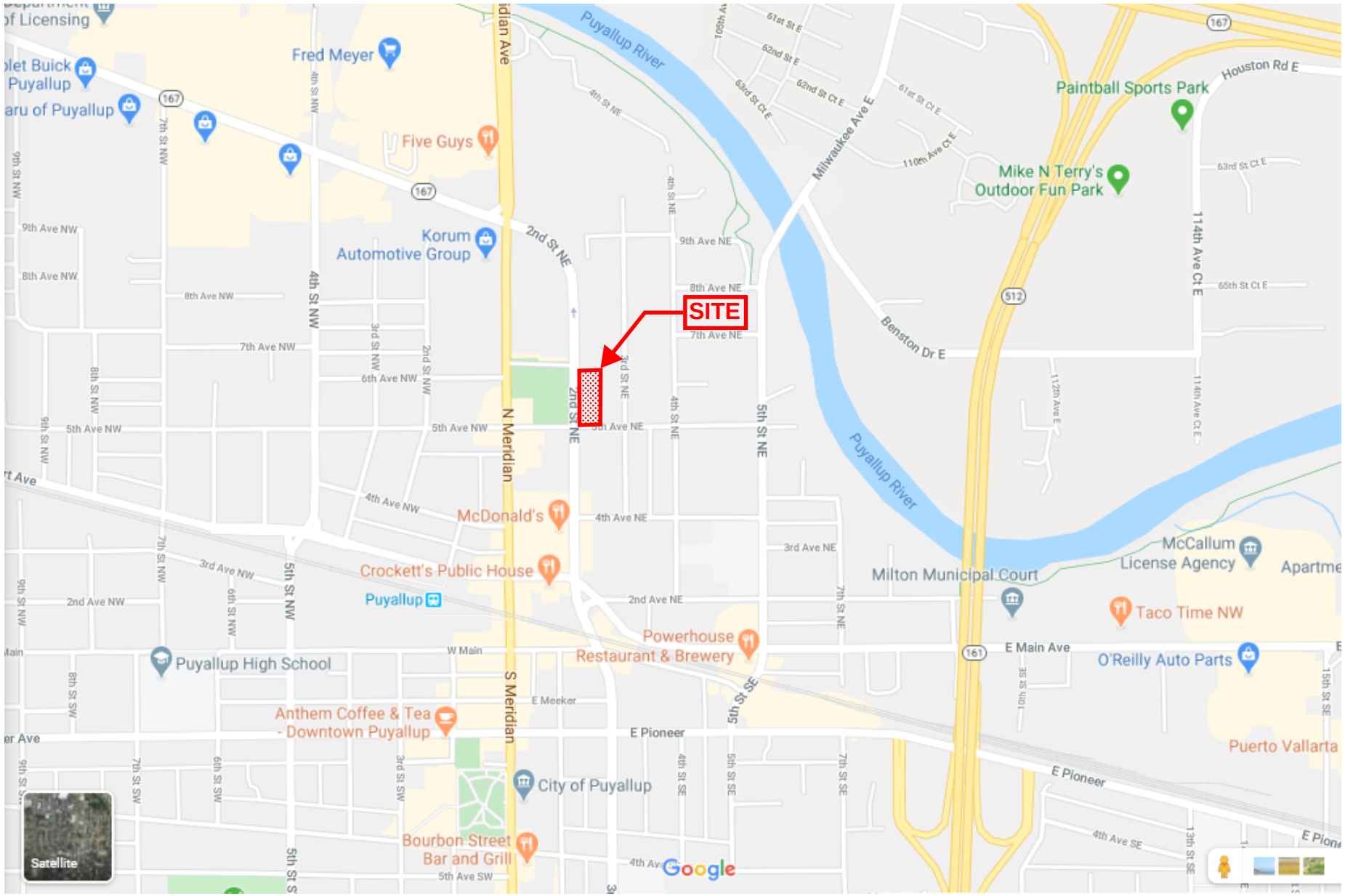
3.10.1 Required BMPs

- Remove by hand any manmade litter, noxious weeds noted on the state noxious weed list (Washington Administrative Code [WAC] 16750) or invasive plant species as identified by Pierce County. Control may be conducted by clipping, pulling, over-shading with native tree and shrub species, or non-mechanized digging.
- Vegetation removal shall be allowed subject to the following standards. Hazard trees may be cut provided that:
    - The applicant submits a report from a certified arborist, licensed architect, or professional forester that documents the hazard and provides a replanting schedule for the replacement trees and receives written approval from Pierce County authorizing tree removal.
    - Tree cutting shall be limited to limbing and crown thinning, unless otherwise justified by the landowner's expert. Where limbing or crown thinning is not sufficient to address the hazard, trees should be topped to remove the hazard rather than cut at or near the base of the tree. All vegetation cut (tree stems, branches, tops, etc.) shall be left within the critical area or buffer unless removal is warranted due to the potential for disease transmittal to other healthy vegetation.
    - The landowner shall replace any trees that are felled or topped with new trees at a ratio of two replacement trees for each tree felled or topped. Tree species that are native and indigenous to the site shall be used.
    - Hazard trees determined to pose an imminent threat or danger to public health or safety, or to public or private property, or serious environmental degradation may be removed or topped by the landowner prior to receiving written approval from Pierce County provided that within 14 days following such action, the landowner shall submit the necessary report and replanting schedule demonstrating compliance with 18E.40.040 B.2.a.(1) through (3) above. *Per PCC Title 18E – Development Regulations – Critical Areas 18E.40.040 B.2*.

3.10.2 Suggested BMPs

- To prevent possible contamination limit fertilizer and herbicide around wetlands and their buffers.
- Limit access to wetlands and their buffers. To avoid compaction do not establish trails within the wetland areas.

Exhibit C



AHBL
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422 TEL
253.383.2572 FAX

PUYALLUP 2ND STREET APARTMENTS
2190606.10

VICINITY MAP

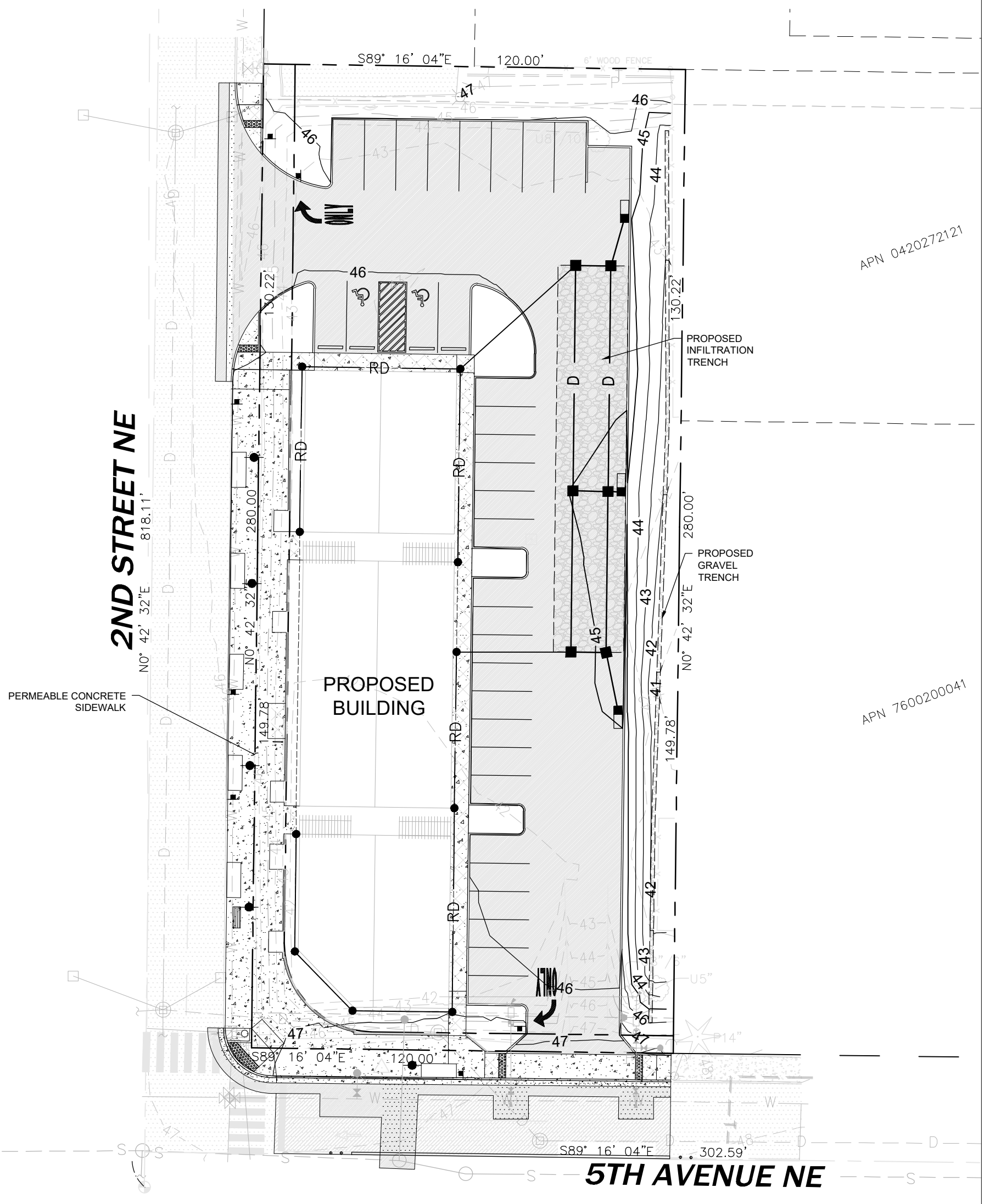
EXHIBIT C-1

N

GRAPHIC SCALE

0 15 30 60

1" = 30 FEET



AHBL
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Civil Engineers
Structural Engineers
Landscape Architects
Community Planners
Land Surveyors
Neighbors

PUYALLUP 2ND STREET APARTMENTS
2190606.10

DEVELOPED CONDITIONS MAP

C-2