Date: October 19, 2015

From: Tom Schueler
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To: Urban Stormwater Workgroup

Re: Response to Comments on Street and Storm Drain Cleaning Expert Panel Report

The Expert Panel Report was released on September 18, and a webinar was held on September 29 in which more than 30 individuals participated. The required 30 day comment period for the new joint BMP Panel review process established by the WQGIT (2014) expired on Monday, October 19. This memo summarizes the comments received by the deadline, and presents a technical response.

Comments were received from two expert panelists (Maguire and Shafer) and one unidentified participant on the debut webinar.

Comment No. 1. *Does the storm drain cleaning credit apply to sediment removal operations that occur during ditch maintenance along open section roads?*

Response: No, it does not. The storm drain cleaning credit only applies to sediment and or organic matter removed from within the storm drain system (i.e. catch basins, storm drain pipes and/or stormwater outfalls), as the panel did not analyze any research on rural or agricultural ditch maintenance or retrofitting. The panel is aware that other ongoing expert panels and researchers may be investigating possible ways to enhance nutrient and sediment removal in agricultural and roadside ditch networks.

Comment No. 2. *Can a community earn the street cleaning credit if it sweeps municipal or commercial parking lots in addition to streets and roads?*

Response: Yes, but generally only when advanced street cleaning technology is used on the parking lot (i.e., in the past, most parking lots were swept using the older mechanical broom sweepers that get low or zero credit under this expert panel's recommendation.

This may require two minor edits to the Appendix E: Technical Requirements to Enter Practice into Scenario Builder. The first involves determining whether parking lots will be assigned to the new transport land use in the Phase 6 CBWM (or not). The second edit would include additional text on how parking lot cleaning effort would be reported to get credit (e.g., report acres of parking lot swept, and then convert back to lane miles using the 1 acre = 1 curb lane mile rule).

Comment No. 3. *The expert panel report should include a review of the limited monitoring data on the pollutant removal performance associated with storm drain*

and catch basin cleaning, as well as provide some standard definitions for the storm drain cleaning practice (Maguire).

Response: Agreed, recommend including a new Section 4.7 that summarizes storm drain cleaning research and provide additional definitions in Section 2. A panelist (Maguire) provided draft text for both sections, which is provided below.

Proposed New Section 4.7.

Summary of Storm Drain Cleaning Research

This section reviews the limited research available to examine the pollutant removal benefits associated with storm drain and/or catch basin cleanouts. As with street cleaning, much of the research has focused on the nutrient content of the sediment and organic matter trapped in the storm drain, but few studies have discerned a statistical improvement in stormwater quality, either due to the presence of catch basins, or based on regular cleanouts.

Mineart and Singh (1994) evaluated the effect of monthly catch basin cleaning in California, and reported potential reductions of 3 to 12% of sediment and trace metals (nutrients were not investigated). Pitt and Bissonnett (1984) reported that twice a year cleanouts of catch basins in Bellevue, Washington could reduce total solids in urban runoff by 10 to 25%, along with 5 to 10% reductions in nutrients and organic matter.

The results of more recent research has been more equivocal. For example, UNH SC (2012) investigated the performance of a deep sump catch basin receiving runoff from a nine-acre parking lot in Durham, NH. The study evaluatedd how the catch basin reduced sediment and nutrient concentrations as they passed through the practice. While they detected about a 10% reduction in TSS loads due to the deep sump catch basin, they did not find any statistical difference in nitrate or total phosphorus concentrations during monitored storm events (the study did not measure the nutrient or organic matter content of the sediments trapped in the catch basin sump).

MWCOG (1993) monitored how well oil grease separators, a type of drain inlet with special sediment trapping chambers, removed sediments, nutrients and metals. The Maryland study demonstrated that sediments and attached pollutants trapped within the chambers were prone to frequent re-suspension, such that pollutant removal could only be assured if they were frequently cleaned out. The study did report that trapped sediments did have a very high nutrient, metal and hydrocarbon content.

High nutrient content for catch basin sediments are frequently reported elsewhere in the literature (see Tables 20 and B-4 in this report for a comparison of nutrient levels in traditional catch basin sediments).

Law et al (2008) presented data on the composition and nutrient content of sediments cleaned out from catch basins without sumps, as measured in Baltimore County, MD. The study noted that coarse-grained sediments and organic matter predominated in the

catch basins sampled. Law et al (2008) reported that most of the nitrogen was associated with the sediment particles, whereas organic matter (leaves) was an important source of phosphorus in catch basin sediments. Coarse-grained material comprised more than 85% of catch basin solids (trash represented ~10% of the material cleaned out from the inlets). The nutrient enrichment data derived from Law et al (2008) was used to define the 2011 CBP storm drain cleaning credit (CSN, 2011).

SPU (2009) examined the interaction between street cleaning and catch basin cleanouts in the same location. The study team monitored sediment accumulation in catch basins located on residential and industrial streets, some of which were cleaned and some that were not. They found that frequent street cleaning by advanced cleaning technology did not change the solids accumulation rate in the test catch basins, which is not surprising given the low solids reduction reported for both practices. SPU (2009) did not assign a pollutant removal rate for catch basin cleaning for local TMDLs.

Smith (2002) evaluated the performance of a catch basin to remove suspended sediment and nutrients along an interstate highway in Boston that was also swept by mechanical broom sweepers. Smith (2002) found that 85 percent of the material trapped in the catch basin was coarse-grained (i.e., >0.25 mm in diameter). Fine-grained material was seldom deposited in the catch basin because its retention time was too short for gravity to separate particles (the median retention time was seven minutes during the median storm). Smith (2002) also reported that the suspended sediment concentrations discharged from the catch basins were not substantially different before and after annual cleanouts.

Smith (2010) investigated the performance of six deep sump catch basins with different hood configurations in reducing gross solids, oil and grease and total petroleum hydrocarbons along an interstate highway in Boston, Massachusetts. The median efficiency of the deep sump basin catch basins for trapping gross solids was 44% over the six month study. Smith (2010) noted that the gross solids accumulation rate for the six deep sump catch basin trapped ranged from 6 to 69 lbs/curb mile. The gross solids that were trapped were predominately natural organic matter (~75%), followed by plastic materials (~20%) and cigarette butts (~5%). The catch basins did not appear effective at removing oil and grease and petroleum hydrocarbons from urban runoff.

Two other studies showed little pollutant removal benefit associated with catch basin cleaning. Irgang et al (2001) sampled stormwater quality during 11 storm events in catch basins located in a residential roadway network, and could not find a statistical improvement in stormwater quality between sites where catch basins had been cleaned or not cleaned. The study team qualified their finding by noting that their study was of short duration and subject to significant variability in pollutant concentrations. Dammel et al (2001) also found that catch basin cleanouts did not improve stormwater quality in successive storm events in Southern California.

Based on the foregoing data, the expert panel concluded that there was insufficient data to support assigning a positive sediment or nutrient removal rate for catch basins, regardless of sump or hood configuration, due to their minimal hydraulic residence

time. The panel took a more conservative approach that nutrient removal credit was only warranted when the mass of nutrient-rich catch basin sediments was measured and physically removed from the storm drain system. The panel also recommended several priorities for future catch basin research.

Proposed Addition to Section 2

Catch Basin Terminology

- *Catch Basin***:** A type of storm drain inlet that contains a sump. Typically a catch basin is constructed using a pre-cast concrete barrel installed vertically, with a cast-iron grated lid at the street surface.

- *Curb-cut Inlets:* A cut in the curb that allows stormwater runoff to enter into the inlet through bypassing the inlet grate.

- *Drop Inlet:* A type of storm drain inlet that does not contain a sump.

- *Deep Sump Hooded Catch Basin*: A type of catch basin that contains a sump that is at least 4 feet deep and a hood.

- *Grate*: A cast-iron cover with no more than 2-inch square openings, installed at street level, though which runoff drains into an inlet. The grate prevents coarse debris contained in runoff from entering the inlet.

- *Hood:* A 90^{o} elbow installed at the outlet of a catch basin to reduce floatable material from the discharge.

- *Inlet:* a structure located below the ground surface with a grated lid at street level that drains road or parking lot runoff. Inlets are typically constructed adjacent to a road curb, and is covered by a cast iron grated lid with multiple openings (each opening no more than 2-inch square). The runoff is directed to drain pipes, then via an outfall to surface waters. May also be referred to as a storm drain.

- *Off-line Catch Basins*: Inlets with only one inlet point at street level and one outlet.

- *On-line Inlet*: Inlets with multiple inlet points. Typically drainage is directed to them from street level and from an inlet pipe.

- *Storm Drain Manhole*: A bend structure connecting stormwater drainage pipes that contains a solid cast-iron cover at street level.

- *Storm Drain Outfall*: Discharge point from a storm sewer system to a surface water or other wetland.

- *Storm Sewer:* an inlet and pipe drainage system.

- *Sump:* A trap located below the outlet invert of a catch basin. The purpose of the sump is to collect solids in stormwater runoff.