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The Board of Water Commissioners for the City of Detroit, Water and Sewerage Department authorizes a **fee-in-lieu rate of $8.00 per gallon managed** for Developers who choose the alternative compliance option under the Post Construction Stormwater Management Ordinance.

Agenda of June 5, 2019
Item No. 19-00171

TO: The Honorable
Board of Water Commissioners
City of Detroit, Michigan

FROM: Gary Brown, Director
Water and Sewerage Department

RE: **Fee In Lieu - Post Construction Stormwater Management Ordinance**

MOTION
Upon recommendation of Palencia Mobley, Deputy Director and Chief Engineer, the Board of Water Commissioners for the City of Detroit, Water and Sewerage Department authorizes a **fee-in-lieu rate of $8.00 per gallon managed** for Developers who choose the alternative compliance option under the Post Construction Stormwater Management Ordinance.

BACKGROUND

The purpose of this memorandum is to provide a summary of the proposed in-lieu fee for development projects that have been approved for an alternative compliance method to comply with the post-construction stormwater management ordinance.

The Stormwater Management Group (SMG) has three sets of cost data to evaluate: 1) conceptual cost data from drainage charge credit engineering analysis; 2) construction contract amounts for green stormwater infrastructure projects that have been installed by DWSD for permit compliance and 3) cost data for other fee-in-lieu programs across the country. Due to the fact that data set 1) is conceptual in nature, we opted to exclude this information from our analysis of cost information for the proposed fee-in-lieu of ordinance compliance on-site.

Detroit Water and Sewerage Green Stormwater Infrastructure Projects

As of the date of this memorandum, DWSD has completed construction, or has achieved substantial completion of thirteen sites that include twelve individual bioretention gardens, and four permeable pavement projects. Construction costs for each of the thirteen sites along with volume managed is summarized in the

table below.

					2-yr volume	
Project Name	Acres Managed	Construction Cost	2-yr volume retained (MG)	2-yr volume detained (MG)	$/gallon removed	$/gallon managed
Vaughan	0.79	$ 125,635	0.025	0.003	$ 5.03	$ 4.49
Evergreen	0.7	$ 154,224	0.018	0.002	$ 8.57	$ 7.71
Stahelin	0.71	$ 139,743	0.021	0.008	$ 6.65	$ 4.82
Greenview	0.58	$ 125,713	0.011	0.002	$ 11.43	$ 9.67
Stoepel Park No. 1	6.45	$ 652,672	0.09	0.01	$ 7.25	$ 6.53
Liuzzo Park	3.1	$ 488,625	0.03	0.06	$ 16.29	$ 5.43
Keeler Street	1	$ 289,162	0.04	0	$ 7.23	$ 7.23
Artesian Street	5.3	$ 457,161	0.06	0.05	$ 7.62	$ 4.16
Constance Street	15.1	$ 497,162	0.57	0	$ 0.87	$ 0.87
Tireman Phase I	6.48	$ 1,217,960	0.02	0	$ 60.90	$ 60.90
Tireman Phase II	3.05	$ 457,680	0.14	0.03	$ 3.27	$ 2.69
Crowell Recreation Center	2.48	$ 731,809	0.09	0	$ 8.13	$ 8.13
O'Shea Park	3.72	$ 582,543	0.03	0.05	$ 19.42	$ 7.28
Overall Average					**$ 12.51**	**$ 9.99**
Average excluding Tireman Phase I					**$ 8.48**	**$ 5.65**

Costs shown in the table do not include design and engineering, land acquisition, or long term operation and maintenance costs.

Cost Data for Fee-in-Lieu Programs Across the Country

A review of research regarding the development of payment in lieu programs across the country found that fees varied greatly. Factors that go into the development of costs for stormwater management fee in lieu data include, but are not limited to, the following:

- Redevelopment versus new development
- Engineering complexity
- Site constraints
- Native soil conditions

West Virginia

A study performed in West Virginia to develop in-lieu fees summarized cost data for bioretention practices from recent sources and is excerpted from the report below.

The study data considered costs for construction, design, land acquisition, and 20 years operation and

maintenance. Excluding an outlier at Beckley #3 site which was noted to be a highly-urban, small project with concrete retaining walls, the study found that a plausible range for a fee would be between **$25 and $60 per cubic foot treated** ($3.34 to $8.02 per gallon treated) with the present value of 20 years of operation and maintenance costs included.

Table C.2. Summary of Cost Data for Bioretention from Recent Sources

Study or Source	Source of Data, Geographic Location	Construction Cost; per cubic foot	Design; per cubic foot	Land	20 Years Operation & Maintenance (O&M); per cubic foot[4]	Total 20 Year Cost; per cubic foot[5]	Average Annual Cost over 20 Years; per cubic foot
King & Hagan (2011): new, suburban	MD, literature, WERF model (2009)	$10.87	$2.72	$0.61	$8.88	$23.08	$1.15
King & Hagan (2011): retrofit, urban	MD, literature, WERF model (2009)	$38.05	$15.22	$0.61	$8.88	$62.76	$3.14
CWP (2011)	VA, NC, DE + literature	$ 15.00	No unit cost; apply per project	Not included	$7.60	$23.00	$1.15
Beckley #1 (2011)	WV	$4.98	$1.59[1]	Not included	WERF[2]	$10.07[3]	$0.50
Beckley #2 (2011)	WV, urban (concrete + grading)	$39.87	$12.76[1]	Not included	WERF[2]	$59.61[3]	$2.98
Beckley #3 (2011)	WV, urban (concrete box)	$53.51	$17.12[1]	Not included	WERF[2]	$101.90[3]	$5.10
Beckley #4 (2011)	WV	$6.05	$1.94[1]	Not included	WERF[2]	$26.68[3]	$1.33

[1] All Beckley sites were designed in-house, so there are no identified design and pre-construction costs. The figures listed are based on an assumed 32% of construction cost (Schueler et al., 2007).

[2] Long-term maintenance costs for Beckley sites were derived using the WERF model for "curb-contained bioretention" (2009) to include routine and corrective/infrequent maintenance costs based on assumed "medium" level of maintenance. Beckley does have some routine annual maintenance cost data, but the WERF model was used to anticipate future costs and corrective actions.

[3] Total life-cycle costs for Beckley sites were derived from the WERF model for "curb-contained bioretention" (2009) using the actual construction costs reported by the City of Beckley.

[4] For the King & Hagan (2011) numbers, the authors of that report assumed that an annual discount rate of 3% (reduced value of the same amount of money spent in the future – see Addendum) would be "washed out" by an annual increase of maintenance costs of 3%. As a result, there is no annual inflation built into these 20 year estimates. This does not match the methodology presented in this Appendix, which recommends a real discount rate of 2.1% based on Office of Management and Budget guidance.

[5] Total 20 year cost estimates may not include all pre-construction (e.g., plan review, inspections, admin.) and ongoing administrative/programmatic costs, so should be considered baseline estimates.

California

Another study performed by the California Stormwater Quality Association summarized implementation costs for bioretention that included planning/design, construction, and 20-year operation and maintenance. The suggested fee-in-lieu was **$45 per cubic foot ($6 per gallon)**.

Detroit

A study performed by HR&A as part of the alternative compliance evaluation for the City of Detroit published general descriptions of selected green infrastructure treatments costs as well. The study included five different green infrastructure techniques, which are summarized in the table below.

General Description of Selected Green Infrastructure Treatments

Type of Intervention	Depth of Free - Board	Planting Media Depth	Stone Depth	Cost per ft^2	Cost per gallon
Bioretention					
- Bioswale	6 inches	18 inches	12 inches	$17.00	$4.25
- Rain Garden	6 inches	12 inches	n/a	$15.00	$4.00
Porous Asphalt	n/a	n/a	4 foot	$8.00	$6.22
Green Roof	n/a	4 inches	n/a	$25.00	$24.31
Rainwater Harvesting System	n/a	n/a	n/a	$40.00	$7.21

Other

Another study evaluated four communities across the country and summarized the rate structure for the fee-in-lieu programs. The four communities evaluated were Washington DC, Aspen, CO, Park Ridge, IL, and San Antonio, TX. The in-lieu fees ranged from $3.57 per gallon retained to $10.22 per gallon detained. One community developed the fee-in-lieu rate based on a cost per square foot of impervious surface ($0.15 to $0.25 per sf).

Recommendation

Based on the green stormwater infrastructure projects that DWSD has already constructed, and supported by the studies referenced above, it is recommended that the fee-in-lieu cost for developers who choose this alternative compliance option be **$8 per gallon managed**. This is based on DWSD's average cost per gallon treated of $5.65 plus 40% for design and engineering and operation and maintenance. The proposed fee-in-lieu cost is comparable to the fee used in many communities across the country.

References

Center for Watershed Protection, 2012. Guidance for Developing an Off-Site Stormwater Compliance Program in West Virginia. Prepared for West Virginia Department of Environmental Protection by Center for

Watershed Protection, Inc. December 2012.