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RATE STRUCTURE ALTERNATIVES

ISSUE

In December 2017, the Whatcom County Council established the Lake Whatcom Stormwater Utility to provide a mechanism to fund efforts to clean up and protect Lake Whatcom (Ordinance 2017-076; under the authorization provided in RCW 36.89). Existing funding sources are not sufficient to meet current and future Lake Whatcom program needs, which primarily relate to compliance with state-mandated reductions of phosphorus to meet federal Clean Water Act requirements. The utility includes the entire unincorporated Lake Whatcom watershed.

This issue paper seeks to establish options and appropriate rate structure alternatives given (1) the emphasis of the program on phosphorus loadings and other water quality impacts, (2) the customer base (mostly residential and forestry), and (3) other key criteria such as data availability and administrative feasibility.

BACKGROUND

Legal Considerations

A rate may be found legally valid if the services that it funds generally benefit those who pay it – a property-specific link between fees paid and level of service received is generally not required. Case law in Washington, notably Teter v. Clark County, has supported the stance that an indirect linkage is adequate justification for a rate.

Throughout the United States, impervious surface area is a widely accepted measure of runoff contribution, providing the basis for rates in most stormwater utilities. In addition, the functional nexus among impervious surface area, runoff contribution, and increased flooding / water quality degradation / damage to habitat is strong and supportable.

The following selection from Stormwater Strategies: Community Responses to Runoff Pollution describes this nexus clearly:

> *"The problem of polluted stormwater runoff has two main components: the increased volume and rate of runoff from impervious surfaces and the concentration of pollutants in the runoff. Both components are highly related to development in urban and urbanizing areas. When impervious cover (roads, highways, parking lots, and rooftops) reaches 10 and 20 percent of the area of a watershed, ecological stress becomes clearly apparent. Everyday activities, including driving and maintaining vehicles, maintaining lawns and parks, disposing of waste, and even walking pets, often cover these impervious surfaces with a coating of various harmful materials. Construction sites, power plants, failed septic systems, illegal discharges, and improper sewer connections also contribute substantial amounts of pollutants to runoff. Sediments, toxic metal particles, pesticides and fertilizers, oil and grease, pathogens, excess nutrients, and trash are common stormwater pollutants. Many of these constituents end up on roads and parking lots during dry weather only to be washed into waterbodies when it rains or when snow melts.*

Together, these pollutants and the increased velocity and volume of runoff cause dramatic changes in hydrology and water quality that result in a variety of problems. These include increased flooding, stream channel degradation, habitat loss, changes in water temperature, contamination of water resources, and increased erosion and sedimentation. These changes affect ecosystem functions, biological diversity, public health, recreation, economic activity, and general community well-being. Urban stormwater is not alone in causing these impacts. Industrial and agricultural runoff are equal or greater contributors. But the environmental, aesthetic, and public health impacts of diffuse pollution will not be eliminated until urban stormwater pollution is controlled."

Source: Peter H. Lehner, George P. Aponte Clarke, Diane M. Cameron, and Andrew G. Frank, Stormwater Strategies Community Responses to Runoff Pollution (Natural Resources Defense Council, May 1999), xi.

Supporting scientific research shows that in addition to increasing the mobility of deposited pollutants, impervious surfaces greatly increase peak flows to streams while decreasing base flows. Higher peak flows cause flooding and erosion, increasing sediment deposition and phosphorus runoff; damage to aquatic habitats; impervious surfaces also reduce infiltration of rainfall which can lower base flows in streams that also impact habitats.

FOCUS ON PHOSPHORUS

What are the causes and sources of excessive phosphorus in the Lake Whatcom Watershed?

Phosphorus sources to Lake Whatcom generated from within its watershed are:

- Soil exposure and disturbance;
- Non-native landscapes, such as lawns;
- Eroded and unstable stream and riparian areas;
- Impervious area creation that decreases infiltration and/or transports phosphorus-laden stormwater (e.g. residential, commercial, roads, etc.);
- Precipitation both dry and wet (e.g. dust and rain);
- Fertilizers and pesticides;
- Improper disposal of organic matter;
- Animal waste;
- Agricultural practices (increased exposed soils, fertilizer, hobby farms, etc.); and
- Inadequate buffer and runoff controls from forest practices.

How are phosphorus problems addressed in the Lake Whatcom Watershed?

The response to control phosphorus loading to Lake Whatcom is multifaceted and is a coordinated effort of Whatcom County, the City of Bellingham, and the Lake Whatcom Water and Sewer District. The partner agencies have developed and executed successive 5-year work plans to implement strategies formulated in 1992 and formally adopted in 1998. The work plans are designed to achieve progressive milestones in the control of phosphorus in stormwater entering the lake and bacteria in stormwater entering lake tributaries.

The Lake Whatcom Management Program addresses policies, actions, and projects in 10 program areas, including the following: Land Preservation; Recreation; Stormwater; Aquatic Invasive Species; Land Use; Utilities & Transportation; Monitoring & Data; Education & Engagement; Hazardous Materials; and Administration.

Details of the measures and timelines within each program area are available in the program's work plans and accomplishments reporting (http://www.lakewhatcom.whatcomcounty.org/our-programs).

Which of these do property owners and citizens have control over?

Awareness of impacts from day-to-day activities of residents and of owners' care of their property is critical to achieving the necessary reductions in phosphorus loading to Lake Whatcom. Extensive and ongoing outreach has been made in order to encourage behaviors that reduce stormwater pollution impacts such as watershed-friendly yard care, pet waste management, vehicle and building maintenance, and other activities.

Which of these can they NOT control?

"Phosphorus precipitation", such as dust and or rain, cannot be locally controlled, but retention and runoff prevention are controllable actions. There is also a natural base level of phosphorus that comes from runoff from areas with natural vegetative cover, which also cannot be controlled.

What is the TMDL mandate? From State and/or Federal?

Previous studies indicate that unnaturally low levels of dissolved oxygen are caused by excess phosphorus runoff from developed areas that leads to excess production and oxygen consumption through respiration as organic matter is decomposed. The Washington State Department of Ecology developed the Total Maximum Daily Load (TMDL) allocation, which has been approved by the U.S. Environmental Protection Agency, which identifies how much phosphorus can be discharged to the lake in order to meet the water quality criteria for dissolved oxygen. The TMDL establishes phosphorus reduction targets addressing dissolved oxygen impairments; these reduction targets are expressed as "effective developed acre" thresholds.

The TMDL requires that the runoff from within the watershed must be reduced to match that which occurs from forested land conditions in 87% of the currently developed areas. According to the Department of Ecology's November 2014 report (revised in February 2016), *Volume 2. Water Quality Improvement Report and Implementation Strategy*, "This does not mean that 87% of the developed area must be converted to forest. Rather, it means that the runoff from that land must be managed so that the effect on the lake is the same as if the runoff came from a forest."

This control of runoff can be achieved by improving the ground surface's ability to absorb and filter stormwater through several methods:

- Provide storage during storms to infiltrate stormwater;
- Harvest rainwater;
- Decrease impervious surfaces; and
- Reduce the concentration of phosphorus in stormwater through source controls and treatment.

The specific means of achieving the goals mentioned within this section are contained in the strategies and the work plans of the Lake Whatcom Management Program, which have been developed and adopted by Whatcom County, the City of Bellingham, and the Lake Whatcom Water and Sewer District.

RATE STRUCTURE ALTERNATIVES

There are a number of potential rate structure alternatives that could be considered, several of which are evaluated below. When evaluating these structures, it is important to balance equity and administrative feasibility. For example, if a rate structure is considered to be very equitable but is cost prohibitive to setup and maintain, a less "perfect" approach may be more desirable if it is less costly to administer.

(A) Impervious Surface Area

- **Concept**: As described previously, the most common approach used by stormwater utilities is to charge customers based on impervious surface area, the hard surface area that prevents or impedes the permeation of water into the ground.
- **Equity:** Impervious surface area is widely accepted as an appropriate measure of a property's contribution of runoff, providing a rational nexus to service received from a stormwater program. Given the diversity that exists among non-single-family residential properties, it is common to charge these customers based on actual measured impervious surface area.

  Because tracking parcel-specific measurements of impervious area for single-family customers would add considerable administrative effort and complexity to the rate structure, the more common practice is to impose a uniform rate on single-family residences based on an estimated average amount of impervious surface area.

  Though this approach may overcharge smaller residences and undercharge larger residences, it is widely considered to be an acceptable compromise between equity and practicality. Some stormwater utilities have strengthened the equity of this approach by adding some distinctions (e.g., small, medium, large) and corresponding rates among single-family customers.
- **Focus on Phosphorus**: Impervious surfaces promote the conveyance of phosphorus, no matter the point of origin due to their inability to retain and absorb phosphorus. The more impervious area on a given parcel, the more likely that phosphorus will be carried into the public street and conveyance system, eventually finding its way into the lake. This can translate to an increase of 10 to 20 times compared to background phosphorus loading levels.
- **Data Availability / Ease of Administration**: Impervious data is not currently available—but it could be obtained at a cost.

(B) Density of Development

- **Concept**: An alternative measurement of runoff contribution involves applying "density factors" to gross parcel size or actual impervious area measurements, adjusting charges depending on the percentage of the parcel covered by hard surface. This approach can acknowledge that, for example, 3,000 square feet of impervious area on a 5,000 square-foot lot more directly impacts the public system and/or receiving waters than an equivalent amount of impervious area on a one-acre lot.

- **Equity:** As with an approach based on impervious surface area, this approach is an appropriate charge basis because it adequately quantifies the relationship between the rate paid and the level of service received.
- **Focus on Phosphorus:** By applying a Density of Development factor to impervious area, this structure suggests that not all impervious area is created equal, due to the sources of phosphorus related to the land-use sources of the impervious area. The more pervious area on a given parcel, the more likely pollutants will not leave the parcel, but land use can add to the phosphorus available to be transported via runoff. For example, rooftops receive phosphorous through atmospheric deposition, whereas a commercial parking lot receives phosphorus deposited by vehicle traffic in addition to atmospheric deposition.
- **Data Availability / Ease of Administration**: Impervious data is not currently available—but it could be obtained at a cost. This rate structure would require an additional calculation in the billing system (chargeable area ÷ gross parcel size), but it would not require additional data as gross parcel area is already available. As with the impervious-based approach, impervious data must be maintained on a routine basis, or as development occurs.

A related rate approach is one based on **runoff coefficients**. This approach is similar to the "density of development" approach in that it can be used to adjust a parcel's charge based on its runoff characteristics – however, it is more closely associated with a parcel's physical properties. When applied to lot size, runoff coefficients are generally accepted as a measure of runoff contribution (and service received). Implementing this approach requires information relating to the basic characteristics of land (e.g. slope and soil type), land use, and lot size. Depending on slope variables and soil characteristics, undeveloped parcels may also be subject to charges under this approach. In measuring runoff contributions by evaluating property-specific characteristics that may impact those contributions, this approach rationally recovers the costs of several aspects of a stormwater program.

However, a key tenet of ratemaking is that charges should apply to a controllable behavior or characteristic. Impervious surface area and development density essentially charge for the increase in runoff generated by developed property over land in its natural state. It is that increase in runoff that is at least theoretically controllable by the property owner. The basic characteristics of the land, soil type, slope, etc., are not controllable by the property owner and as such, charging for that runoff is more akin to taxing a property. Using runoff coefficients as a rate setting basis is therefore not recommended.

(C) Trip Generation

- **Concept**: This structure charges parcels based on vehicle trip generation. The Institute of Transportation Engineers' *Trip Generation* Manual assigns a number of daily trips to specific land use categories – this information could be used to recover the costs of water quality activities within the stormwater program. Customer land uses and lot sizes would also be required in order to calculate equitable rates, creating rate distinctions between residential and the few non-residential uses in the watershed.

- **Equity / Focus on Phosphorus:** This structure relates automobile traffic to non-point-source pollution contributed by properties. Automobile emissions on roads are a significant source of phosphorus, so charging parcels based on estimated trip generation could provide a rational nexus between cause and effect. Trip generation models provide good estimates of developed land conditions, but do not capture the temporary — albeit substantial — phosphorus that is generated by land-disturbing construction and transported by construction traffic.
- **Data Availability / Ease of Administration**: Trip generation data is not currently available through the County, but could be determined through the Trip Generation Manual previously mentioned. Land use would need to be tracked as development or redevelopment occurs. Lot size (gross parcel area) is already available through the County assessor.

Other less common structures…

(D) Parcel Size

- **Concept:** This rate structure would not be based on impervious area—instead using only gross parcel size as the basis for a charge. One could argue that larger parcels might contribute more phosphorous to the watershed than smaller parcels do.
- **Equity:** A core component of a defensible fee structure is a measure of "controllability" by the customer (such as water usage, or impervious area). This structure does not incorporate that element as lot size is not controllable by a customer and therefore, this rate structure may not be as defensible as some of the other options.
- **Focus on Phosphorus:** Some sources of phosphorus, such as grass clippings and disturbed earth, might happen more frequently—or in larger quantities—on parcels of a certain size. However, the reverse can also be applied. For example, a larger pervious area allows for Best Management Practices (BMPs) within landscapes and planting buffers that capture and retain more phosphorus, such as rain gardens and/or native vegetation coverage.
- **Data Availability / Ease of Administration:** This alternative would not require additional data gathering, as gross parcel size is already tracked in the County assessor database.

(E) Impervious Surface plus Vegetated Surface Type

- **Concept**: This structure offers a hybrid between parcel size and impervious surface area. Similar to the Parcel Size alternative, all surface area would be charged. However, different rates would be charged for each of the following area types: (1) impervious; (2) landscaped vegetation, and (3) undisturbed native vegetation. Impervious area would be charged the highest rate, landscaped vegetation the next highest rate, and undisturbed native vegetation the lowest rate.
- **Equity:** This alternative associates the type of surface area with a unique rate. This structure could be perceived as providing additional equity, as it acknowledges that surfaces that are traditionally considered to be pervious do generate some level of runoff.
- **Focus on Phosphorus**: Impervious area generates 10 to 20 times more runoff than undisturbed native vegetation. Landscaped vegetation generates 2 to 8 times the runoff of undisturbed native vegetation depending upon soil, slope, and soil hydration.

- **Data Availability / Ease of Administration**: Impervious data is not currently available—but it could be obtained at a cost. Data on which portions of a parcel are landscaped vegetation or native vegetation are not available either, but could potentially be gathered through the use of GIS / parcel imagery technology. This data would need to be updated on a routine basis as parcels develop or are re-landscaped. This alternative likely represents the most costly option and the most difficult to setup and maintain on a year to year basis, but perhaps most effectively reflects phosphorus contribution.

(F) Lawn Size

- **Concept:** This rate structure would not be based on impervious area—instead using only gross lawn size as the basis for a charge. One could argue that larger lawns might contribute more phosphorous to the watershed than smaller lawns do (grass clippings, animal waste, etc.)
- **Equity:** This structure provides more "controllability" than a structure strictly based on parcel size, as customers can generally control lawn size.
- **Focus on Phosphorus:** Some sources of phosphorus, such as grass clippings and disturbed earth, might increase as lawn size increases. In theory, smaller lawn sizes (and greater retention of native vegetation) throughout the watershed would equate to less phosphorus entering the lake. More to the point, more diverse landscape with native plants and vertical profile store more precipitation in the vegetation and larger root structure to allow more opportunity for plant uptake of phosphorus so it is not available to runoff.
- **Data Availability / Ease of Administration:** This alternative would require additional data gathering (at a cost), as lawn size is not currently tracked in the County assessor database. The data would need to be maintained as development occurs (trackable through the permitting process) as well as when parcels change lawn size (periodic review of updated aerial imagery.

CONSIDERATIONS FOR COUNTY

Table 1 summarizes the various rate alternatives covered in this issue paper. Pending an assessment of the cost to develop accurate data, it is recommended that the County consider the "Impervious Surface plus Vegetated Surface Type" approach.

Table 1. Evaluation of Potential Rate Structure Alternatives

Rate Structure	Equity / Defensibility	Administratively Feasible	Cost of Implementation
(A) Impervious Surface Area	●	◐	$$
(B) Density of Development	●	◐	$$
(C) Trip Generation	●	◐	$$
(D) Parcel Size	○	●	$

Rate Structure	Equity / Defensibility	Administratively Feasible	Cost of Implementation
(E) Impervious Surface plus Vegetated Surface Type	●	○	$$$
(F) Lawn Size	◐	○	$$

Equity & Administration Legend:

● = More equitable or easier to administer

◐ = Middle option

○ = Least equitable or more difficult to administer

Estimated, Relative Cost Comparison Legend:

$ = Less costly

$$ = Middle option

$$$ = More costly