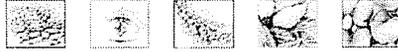


Associated Earth Sciences, Inc.



Celebrating Over 25 Years of Service

Technical Memorandum

Date: September 2, 2010

To: Ed O'Brien
Bill Moore

Project Name: Ecology LID Technical Advisory Committee

From: Curtis J. Koger, L.G., L.E.G., L.Hg.
Associated Earth Sciences, Inc.

Project No: KH100275A

Subject: LID Draft Standards Comments

Thank you for the opportunity to provide comments on the Draft Low Impact Development (LID) standards issued to the Advisory Committee members on August 2, 2010. My comments are limited to three key areas in this comment memorandum. These include: 1) the determination of “realistic” infiltration rates, 2) the potential for unintended adverse impacts from Mandatory List “infiltration,” and 3) design flexibility.

1) and 2) Infiltration Rates/Unintended Adverse Impacts

The determination of realistic infiltration rates is critical to the proper function of rain gardens, below-pavement infiltration systems, and other LID features intended for infiltration into underlying soils. The preferred method for determining infiltration rates in most applications should include in-situ field infiltration testing. The current Washington State Department of Ecology (Ecology) Pilot Infiltration Test (PIT) method can be modified to reduce the cost of the test, while still obtaining reliable information on in-situ infiltration rates. The use of grain size analysis as a basis for the determination of the effective saturated hydraulic conductivity of the receptor horizon is relatively inexpensive, but must be used with caution in many applications. Infiltration rates can vary by a full order of magnitude for samples with the same gradation as determined from sieve tests. The use of grain size as a basis for the determination of infiltration rates should be limited to very small (generally less than 5,000 to 10,000 square feet) catchments.

The infiltration rate is only a part of the overall site evaluation process needed to determine if various LID features, such as rain gardens or infiltration below pavement, should be incorporated. The current proposal is to require rain gardens in soils with field-tested rates as low as 0.15 inches per hour (in/hr), and with below-pavement field-tested rates as low as 0.07 in/hr. These low infiltration rates are typically associated with highly stratified moisture-sensitive soils.

Stratification is typically horizontal and results in horizontal ground water flow. This will result in stormwater emerging at cuts in slopes, in fill slopes, or other locations with a high potential for unintended adverse impacts. It is likely many projects would be constructed using the Mandatory List approach, with the expectation that stormwater will be adequately managed, only to find out after construction that discharge from features, such as rain gardens or the pavement storage layer, has adversely impacted on-site or off-site properties.

The infiltration rate alone is not sufficient reason to require installation of some of the LID elements on the Mandatory Lists. There are many project sites, especially on slopes, where the need to meet density requirements, maintain native vegetation corridors, comply with *Critical Areas Ordinance* (CAO) requirements and other site constraints, will result in lots with extremely small footprints. This will severely restrict the ability to safely discharge stormwater into LID elements that are presented on the Mandatory Lists, and will require discharge at larger centralized “rain garden” locations. Potential adverse flow impacts due to ground water mounding must be considered for rain gardens that receive stormwater runoff from larger catchments and for practical purposes will function as infiltration basins. The current standard of practice includes a ground water mounding analysis to verify infiltration systems will function as intended to avoid overflow from the facility during storm events.

Recommendation

Infiltration rates must be presented as a long-term design rate, after appropriate correction factors, as currently required in both the Ecology and King County stormwater manuals. Ground water mounding impacts must be evaluated, if necessary, and the “fate” of infiltrated stormwater must be adequately characterized. The stormwater system must be understood in context of the entire site design, and the potential for unintended on-site or off-site adverse impacts must be evaluated prior to implementing Mandatory List “infiltration” elements.

3) Design Flexibility

The infiltration rate and unintended adverse impacts presented in the previous section underscore the need to maintain flexibility in site planning and design. The need for flexibility based on site-specific conditions also requires flexibility for the local municipality to provide a regulatory framework to efficiently process designs that do not follow a Mandatory List. Resource protection will be enhanced through alternative flow-control methods in some cases.

Recommendation

Allow and encourage site-specific design solutions to incorporate flow-control methods that may not be termed LID, but are adequate to achieve the aquatic resource protection goals intended by the use of LID practices.