New Jersey Department of Environmental Protection
Infiltration Stakeholder Meeting – Workgroup Meeting
Meeting Summaries

In follow-up to the stakeholder meetings on June 23 and June 29, 2017, DWQ held Workgroup meetings on July 25, August 16, September 6, October 19, and November 28 to discuss specific parameters and values to be used in routing calculations for stormwater infiltration. The concepts discussed at the meetings are outlined below. This should not be interpreted as a Department commitment to these concepts. This draft concept is developed for the consideration and comment of the larger stakeholder group.

Infiltration BMPs:

The Hantush Spreadsheet would be used and the following would apply:

Hydraulic Conductivity: Horizontal:Vertical 5:1 in coastal plain – 1:1 outside coastal plain. Apply FOS to tested value. (Issue will be revisited if meeting participants determine that there is a testing method to measure the horizontal hydraulic conductivity, and if so, can that measured value be used in lieu of the prescribed ratio of 5:1 or 1:1?)

Specific Yield: The default value would be .15, with a maximum of up to .2. To use a value other than .15, the applicant must perform a specific yield test on soil collected from beneath the basin bottom. (Issue will be revisited after meeting participants understand the availability of specific yield tests and which test method is most appropriate).

Thickness of the Saturated Zone: The default value would be 10 feet, with a maximum of up to 80 ft. To use a value other than 10 feet but not higher than 80 feet, the applicant must have one continuous sampling soil boring per 20 acres on the major development site that does not show a limiting layer before the depth they propose to use as the value of the Thickness of the Saturated Zone. A continuous sampling soil boring from a neighboring site within 1000 feet of the infiltration area may be used in place of the onsite continuous boring sample, provided that the boring sample location is within the same geologic formation. If a limiting layer is found and the applicant proposes to use a depth greater than the depth of the limiting layer than that limiting layer must be excavated below the basin bottom. (The values of 10 feet and 80 feet were determined by reviewing analysis of thickness of the saturated zone from data from USGS drillers logs).

4 runs of the Hantush spreadsheet must be performed:

Run 1: Kv * FOS with Kh * FOS
Run 2: Kv with Kh
Run 3: Kv * FOS with Kh
Run 4: Kv with Kh* FOS

Using infiltration in the routing could only be accepted if all 4 of those runs showed that the groundwater mound does not reach the bottom of the basin, or impact nearby properties, and the basin drains in 72 hours or less.

Combination Infiltration and Extended Detention BMPs:

Additional modeling with a routing program would be necessary for combination Infiltration and Extended Detention BMPs. The routing would determine the volume of stormwater infiltrated. The infiltration must be based on a constant hydraulic conductivity applied over the infiltration surface area of the BMP. The hydraulic conductivity must be ½ the lowest field tested rate as described in appendix E.

After routing analysis is performed, the Hantush spreadsheet would be used, with the values for Hydraulic Conductivity, Specific Yield, and Thickness of the Saturated Zone as described above. The stormwater infiltrated using the Hantush spreadsheet (recharge rate X area X time) must equal the total volume infiltrated in the routing. Additionally, the timeframe of infiltration used in the Hantush spreadsheet must match the timeframe of infiltration shown in the routing. As above, 4 runs of the Hantush spreadsheet would be performed.

Using infiltration in the routing could only be accepted if all 4 of those runs showed that the groundwater mound does not reach the bottom of the basin, or impact nearby properties, and the basin drains in 72 hours or less.

Parameters and Values for 2D and 3D modeling was tabled for future discussions.

Pretreatment Requirement: The following Stormwater BMPs that use infiltration in the routing calculations would be required to have pretreatment: Infiltration Basins, Bioretention Systems, and sand filters. Pretreatment may consist of a forebay or any of the structural BMPs found in BMP Manual Chapter 9: Structural Stormwater Management Measures. The forebay must be sized to hold volume of equal to or greater than 10% of the water quality design storm. The intention of the pretreatment requirement is to protect the performance and longevity of the BMP, the intention is not that the pretreatment BMP itself achieve the 80% TSS reduction that is required as part of the NJAC 7:8 water quality standard.

Revisions to Appendix E:

Revisions to Appendix E should include more detailed prescribed instructions for each test method. Revisions may also include standard templates for recording test results as a means to reduce the errors in administering the test and recording the results.

The following two Testing Methods are suggested for removal because both are very difficult tests to perform and therefore when it is performed it is often done incorrectly.

- Double Ring Infiltrometer
- USBR 7300-89

The following Testing Methods are suggested for inclusion:

- Single Ring Infiltrometer
- Slug Test

- Unsaturated (Cased Borehole) Slug Test

Soil Testing Locations:
Alternative soil testing requirements are suggested for sites with smaller scale, distributed stormwater BMPs. With smaller scale, distributed BMPs, it could potentially be overwhelming to perform 2 test pits in the infiltration area of each BMP (as required in Appendix E), especially since soil testing is often performed before the final location of stormwater BMPs is determined.

Below is a framework developed by workgroup members. Feedback from the larger stakeholder group on the overall approach as well as specific values is encouraged.

- This approach would be applicable to BMPs below a certain footprint threshold. For example, 5,000 or 3,500 square feet of BMP footprint.
- A minimum of 3 test pits must be performed on the site to be able to extrapolate the seasonal high-water table elevation to BMPs that have no test pits in its footprint.
- The total number of soil profile pits shall be equal to at least 1 per 5,000 square feet of BMP area (with a minimum of 3 for any site)
- All BMPs must have at least one test pit within a required distance. For example, all BMPs must be within 200' of a test pit if the BMP and test pit are in the same soil mapping unit. If a BMP and a test pit are not in the same soil mapping unit, the distance between the test pit and the BMP is to be no greater than 50'.
- Tests must be distributed throughout the area where small scale distributed BMPs are proposed
- The lowest tested permeability rate (with factor of safety) must be used in the design of all small scale distributed BMPs on-site. A test directly in the BMP would replace the lowest tested permeability rate for that BMP.
- Other requirements (outside of soil testing location requirements) in appendix E are to remain and be applicable.

Impacts of Seasonality: The viscosity of freshwater varies by about a factor of 2 from winter (~0 C) to summer (~25-30 C). Therefore, vertical hydraulic conductivity (Kv) measured with 25 C water would be twice the Kv measured in winter. Apply a correction factor depending on the temperature of the water and soil used during the test. This is not "a factor of safety", this is an acknowledgement that the value measured in July is not representative of the conditions that would occur in runoff events that are common in the late winter/early spring.

Impacts of Stormwater Salinity and Chemical Makeup: While salinity does affect the viscosity of water, the impact of salinity on stormwater infiltration rates is minimal/negligible, and as such is not suggested to be accounted for in the routing calculations. The chemical properties of stormwater could have impact on soil properties, and as such, impact infiltration rates over time. Input from a soil scientist is needed to determine if this is a meaningful impact. If the impact is meaningful, one approach to addressing it would be to identify vulnerable soil types.