Applied Environmental Technology

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Jon H. Lindert, P.E. LEED AP
Strand Associates, Inc.
910 West Wingra Drive
Madison, WI 53715

RE: Inclusion of Suntree Technologies, Inc. Nutrient Separating Baffle Box (NSBB) on Qualified Product List for Manufactured Water Quality Structure of the State of Ohio Department of Transportation (ODOT)

Dear Mr. Lindert:

I am writing to address inclusion of the Nutrient Separating Baffle Box (NSBB) on the Manufactured Water Quality Structure Qualified Product List for the State of Ohio Department of Transportation (ODOT). The NSBB is a Manufactured Treatment Device (MTD) for stormwater treatment supplied by Suntree Technologies, Inc. The Suntree NSBB lies in the general technology category referred as *Hydrodynamic Sedimentation Manufactured Treatment Device* (HSMTD) by the New Jersey Department of Environmental Protection (http://www.bmpdatabase.org/), or referred to as *Manufactured Device-Physical* by the International Stormwater BMP Database of the Water Environmental Research Foundation and the American Society of Civil Engineers (http://www.bmpdatabase.org/).

The Suntree NSBB has received full verification by the New Jersey Corporation for Advanced Technology (NJCAT) for 80% TSS removal at 1.30 cfs. NJCAT verification is described in: NJCAT TECHNOLOGY VERIFICATION, Nutrient Separating Baffle Box Evaluation with 100 μm Particles, Suntree Technologies Inc. June, 2013, which is at: http://www.njcat.org/uploads/newDocs/NSBB100micronverificationreportFinal.pdf. The NJCAT performance testing included full removal efficiency testing and resuspension testing. Verification testing was conducted according to the hydrodynamic protocol established by the New Jersey Department of Environmental Protection (NJDEP, 2013), using 100 μm test sediment test sediment with an intrinsic density of 2.65 grams per cubic centimeters (Smith, 2013).

The results of NSBB verification testing compares well to other technologies. A primary measure of the treatment performance of a hydrodynamic device is its ability to remove sediments, measured as Total Suspended Solids (TSS). The particle size distribution (PSD) of stormwater sediments is a key characteristic that determines the TSS removal

NJDEP (2013) New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device. January 25, 2013.

Smith, D. (2013) Nutrient Separating Baffle Box: SWEMA Hydrodynamic Protocol Evaluation with 100 μm Sediment Particles. Prepared for the New Jersey Corporation for Advanced Technology, Newark, New Jersey, June 2013.

effectiveness of hydrodynamic devices. Simply stated, larger particles ("larger PSD") settle faster and are easier to remove, while smaller particles ("smaller PSD") are more difficult to remove. The PSD of sediment particles is therefore crucial to evaluating, comparing and permitting of hydrodynamic sedimentation MTDs.

In the real world, stormwater particles have a very large range of particle sizes and PSD varies greatly with location and in time. To overcome these difficulties, permitting agencies have adopted standardized test protocols to assess TSS removal performance. These protocols include specifications for the specific density and the particle size distribution (PSD) of test sediments. Alternatively, protocols can specify the test sediment as a specific commercially available material, such as OK-110. However the specification is formulated, the test sediment must have an intrinsic specific density of ca. 2.65 grams per cubic centimeter, which is that of inorganic stormwater particles such as coarse and fine sand. That being the case, PSD is the main factor that must be considered for hydrodynamic MTD evaluation.

The Nutrient Separating Baffle Box was NJCAT verified for 80% TSS removal using a sediment with a PSD centered on 100 μm. As described in Smith, 2013, the sediment particles used in NJCAT verification testing of NSBB had a mean d_{50} of 97.5 μm (d_{50} is the particle size for which 50 percent of the sediment mass is finer, and is a key PSD characteristic). *ODOT Construction and Materials SS- 995* specifies that hydrodynamic devices, to be included on the Manufactured Water Quality Structure Qualified Product, must be tested using OK-110 or F-110. OK-110 or F-110 are commercial sediments which are no longer available. However, the d_{50} of OK-110 is approximately 110 μm and that of F-110 is similar or larger. The test sediment used in NJCAT verification of the Nutrient Separating Baffle Box has a smaller d_{50} than either OK-110 or F-110 and was therefore finer ("smaller PSD") that either test sediment specified by *ODOT Construction and Materials SS- 995*. The sediment used in NJCAT verification of the NSBB thus provided a more rigorous test of sediment removal performance than that required by the *ODOT Construction and Materials SS- 995*. Consequently, the NSBB *de facto* meets the criteria stated in *ODOT Construction and Materials SS- 995* and should be placed on the Qualified Product List for a Manufactured Water Quality Structure. A copy of the Smith, 2013 report is available on request.

I submit this letter on behalf of Suntree Technologies, Inc. and respectfully request your review. I will be happy to discuss this with you at your convenience.

Sincerely,

Daniel P. Smith

Dr. Daniel P. Smith, P.E., DEE, BCEE
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cc: Thomas Happel, President, Suntree Technologies, Inc.
Deborah O'Brien, J.D., Lowis & Gellen LLP