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LID Treatment Train Tool Version 2.2 (2.2.9) Release Notes:

We are excited to announce the release of Version 2.2 of our stormwater modeling software. This update introduces two significant enhancements that will expand the capabilities of the software.

Introducing Trees as LID Option:
In response to increased uptake of trees as a green infrastructure option, we have added the ability to model the impact that trees have on the water balance of a site. With this new feature, users can now model both trees planted in ground and in soil cells. Trees are widely recognized as valuable Green Infrastructure (GI) components for municipalities. By quantifying their effects, this functionality can guide tree planting efforts and provide valuable insights. It is worth noting that no other stormwater model currently provides this level of detailed tree modeling alongside other SWMM 5 functionalities.

Cost Estimation for LIDs and Green Infrastructure:
We have also introduced a costing functionality to estimate the capital and 25-year maintenance costs of LIDs, including trees. This feature allows users to accurately assess the financial implications of their stormwater management plans. The costing functionality is based on the STEP LID Lifecycle costing tool, utilizing the RSMeans database of labor and material costs. We have developed costing curves that establish a relationship between the area of the LID practice and the cost for a standard design. In cases where there are significant design differences, separate curves have been developed (e.g., bioretention with and without underdrains).

Additional Details:

- The tree modeling functionality has been designed to be forward compatible with the existing SWMM5 engine. This means that LID TTT project files can be seamlessly opened in the EPA's SWMM 5 model. To ensure compatibility, we have utilized the existing SWMM 5 elements, specifically the subcatchment and bioretention elements, as the foundation for incorporating tree modeling into the software. It enables the modeling of canopy processes (interception, drip, throughfall, and evaporation) as well as surface and soil processes (infiltration, runoff, and evaporation).

- The LID TTT includes various popular Greater Toronto Area (GTA) tree species to choose from. Users also have the flexibility to represent other trees at various ages by adjusting the values for Leaf and Canopy area. The Leaf Area Index (LAI) value, calculated from these parameters, is used to determine the water balance processes.

- The LID TTT does not model transpiration processes. However, the software does model evaporation, based on potential evaporation targets and the availability of water at the surface of the canopy and on the soil. Once surface water is evaporated, infiltrated soil water in excess of the wilting point is evaporated.

- Trees in the LID TTT can be represented in three ways: using a subcatchment element, describing the landcover as "landscaped" or "forest," or utilizing the Trees LID option. The subcatchment element provides a high-level estimation and is recommended for larger contiguous areas. The Trees LID option allows for more detailed modeling of individual or small patches of trees, such as those found along a median of a parking lot. Additionally, it enables the modeling of trees planted in soil cells, capturing the processes of both canopy and soil cells. It is

important to note that the hydrology routines for subcatchments and LIDs differ, with LIDs using the Green and Ampt equation for infiltration. Therefore, direct comparison between the two routines should be avoided. If the user wishes to perform a before and after calculation involving tree planting, it is advisable to ensure that the two routines provide similar water balance results before adding trees.

- To model the before and after effects of tree planting, the user may choose to model zero trees using the Tree LID option. When the number of trees within the Tree LID polygon is set to zero, the gap between leaves and trees exceeds 100%. This occurs because the equation used to calculate gaps within each canopy and between trees requires a non-zero value. To address this, the user can override the canopy area value to 0.1 while setting the number of trees to zero, resulting in a 100% gap between leaves and trees.

These updates will enhance the capabilities of LID TTT, enabling more comprehensive evaluations of stormwater management designs including enhancements to the preliminary water balance assessment with the incorporation of trees. We value your feedback and encourage you to explore these new features in Version 2.2.

Thank you for your continued support.

- Sustainable Technology and Evaluation Program