**WDNR Approximate Hydrologic Modeling Preferences**

The Contractor shall create the approximate hydrologic models in accordance with the WDNR’s zone A preferences listed below using HEC-HMS 4.10 or higher. Before beginning work, the Contractor will need to coordinate with the WDNR to ensure models ‘tie-in’ with any nearby studies.

**Terrain Data:** Use the 10-meter DEM provided by the WDNR.

**Loss Rate Method/ Abstraction:** SCS Curve Number (CN). The WDNR will provide the CN grid to use.

**Transformation:** SCS Unit Hydrograph / CN Lag Method. Use standard (PRF 484) for graph type.

**Baseflow:** None

**Routing:** Muskingum-Cunge trapezoidal cross section. Use a Manning’s ‘n’ value of 0.05 and an index Celerity of 5 ft/sec for routing reaches. If the stream slope is <0.0004 and , then the lag model should be used (refer to the Applicability and Limitations of Routing Models section in the HEC-HMS Technical Reference Manual).

**Meteorological Model:** MSE3 rainfall distribution developed by NRCS and NOAA Atlas 14 24-hour rainfall depths. The average precipitation depth should be calculated for each subbasin.

**Calibration:** When existing FIS flows are available, models should be calibrated to match the FIS flows within 20%. Lag times and CN values should be adjusted to change the resulting discharges.

There are gages located on Bull Brook (USGS Gage 05341313) and Apple River (USGS Gage 05341500). The HMS models for these streams should be calibrated to match the 1% annual chance flow calculated from a gage analysis.

**Flow Change Locations:** At a minimum,flow change locations should be placed at the upstream extent of each stream to be modeled as well as at any locations where significant tributaries drain into the stream. Junctions should also be placed upstream of these confluences to capture the subbasin inflow before the confluence where significant along hydraulically connected reaches. Additional flow change locations should be added along a stream when drainage area has changed significantly, using engineering judgement.

**Subbasin Size:** Typically, the subbasin size should not exceed 2,000 acres (3.125 sq. miles). Larger subbasins should be sub-divided until they are less than this threshold.

**1% Plus Calculations:** Use the “1%+Flow\_RainfallRunoff” spreadsheet provided by the WDNR to calculate.