

Section 5

Summary and Recommendations

5.1 Summary of Results

The Spruce Run and Mulhockaway Creek SWMM models were developed to assist the NJWSA with the assessment of potential stormwater runoff pollutant loadings that may occur through continued development within the Spruce Run Reservoir drainage area. The models provide a method for comparing potential pollutant loadings for the major stormwater pollutants under different land use scenarios.

For this study, a build out land use scenario was developed to represent the full potential of the existing zoning regulations of the municipalities within the drainage area. The existing conditions of the watershed were established as a baseline from which the build out pollutant loadings could be compared. Current water quality conditions within the watershed are considered good, so the existing stormwater runoff pollutant loading estimates provide a useful benchmark to ensure that water quality conditions in the watershed do not degrade. The results of the modeling efforts were presented in Section 4 of this report and are summarized for each model study area below.

5.1.1 Spruce Run Study Area

The simulated annual runoff pollutant loadings within the Spruce Run study area were estimated to increase for the metals (Copper, Lead, Zinc), and decrease for the remaining constituents (BOD, COD, TSS, N, and P). Available water quality data and literature review indicate that phosphorous is the only pollutant of concern within the area, and that lead and copper have exceeded surface water quality standards in the past. The predicted increases in lead and copper concentrations could be critical to surface water quality of the study area. Also, although phosphorous loadings are projected to decrease across the entire study area as agricultural land is replaced by low density suburban development, some subwatersheds may experience increases in annual phosphorous loadings, which could result in local occurrences of algal blooms. Results suggest that only phosphorous and heavy metals may become a concern within the study area with build out.

5.1.2 Mulhockaway Creek Study Area

The simulated annual runoff pollutant loadings within the Mulhockaway Creek study area also were estimated to increase for metals and decrease for the remaining constituents. Available water quality data and literature review indicate that phosphorous is the only pollutant of concern within the area and that lead concentrations have exceeded surface water quality criteria in the past. Similar to the Spruce Run study area, phosphorous loading did increase for some of the subwatersheds. Phosphorous and lead may become a concern within the study area under future development scenarios.

5.2 Recommendations

While the SWMM models developed for this study provide the NJWSA with a tool for assessing the potential impacts of urbanization, additional work may be helpful to further refine the models and gain a better understanding of runoff and pollutant loading from the Spruce Run Reservoir watershed. Suggested additional work includes a wet weather sampling program, a water quality model of the reservoir and streams, strengthening municipal ordinances (variance-proofing), and requirements of BMPs for new developments.

Wet Weather Sampling Program

The annual pollutant loads estimated from the SWMM models rely on event mean concentrations derived from extensive databases of stormwater runoff quality data. A goal of this study was to utilize existing local water quality data to compare, and where possible, adjust these EMCs to better reflect local conditions; however, the existing wet weather water quality data was limited and not of sufficient quantity to justify modification of the EMCs. A wet weather sampling program would provide valuable insight into the local water quality conditions and the effects of stormwater runoff on water quality. While wet weather sampling programs can be expensive and difficult to conduct, even a limited wet weather sampling program can be beneficial if properly executed with well established goals.

A basic wet weather sampling program includes a dataset of at least 10 storms of different total volumes, durations and intensities. Water quality samples should be taken at the onset of the storm and incrementally during and after the event. Representative samples of the stormwater runoff hydrograph are taken to reflect changes in stormwater runoff concentrations during the storm can be properly assessed. Data obtained from this type of program could then be compared with the existing dry weather water quality data so that local stormwater runoff concentrations could be estimated during and after significant rainfall.

Water Quality Model of the Spruce Run Reservoir

The SWMM models developed for the two study areas only provide a portion of the information needed to assess the current conditions and the impacts of development to the reservoir. A water quality model of the reservoir would allow a better assessment of how stormwater runoff pollutant loads affect in-stream and in-reservoir concentrations. Without the in-stream and reservoir water quality modeling, the fate of the stormwater runoff pollutant loads cannot be properly assessed. It is recommended that a basic water quality model of the stream and reservoir be developed, with the focus on nutrient loading and its impact to dissolved oxygen.

Protection of Existing Municipal Zoning Ordinances

The build out analysis indicated that the existing municipal zoning ordinances within the study area did a reasonable job of preventing further urbanization within the study area. However, municipal zoning ordinances are subject to revision and variances are routinely granted to development that otherwise could not occur. NJWSA should encourage the municipalities within the study area to maintain their

existing zoning ordinances and limit variances. Extensive amounts of sprawl have already occurred and continue to occur, but may be prevented if existing zoning ordinances are enforced.

Stormwater Best Management Practices

Development that does occur within the watershed should include stormwater best management practices (BMPs) to alleviate or eliminate the stormwater and water quality impacts. BMPs that reduce pollutants identified as concerns within the study areas should be implemented preferentially over those that do not. While a full examination and discussion of BMPs are outside the scope of this study, the following list provides some example BMPs that reduce phosphorous, lead, and copper loads from stormwater.

- ?? Bioretention – vegetative filtration device in which runoff is routed over a grass buffer and onto a plant covered area.
- ?? Wetlands – natural or constructed wetlands can be extremely effective, aesthetically pleasing, and provide natural habitat.
- ?? Extended Detention Basin – dry or wet basin that maintains an extended residence time for stormwater runoff and allows for sedimentation and settlement to occur.
- ?? Infiltration Basin – designed to allow stormwater runoff to infiltrate the ground.
- ?? Filtration – stormwater runoff passed through infiltration media is stripped of particles.

NJWSA should remain engaged with the local municipalities, and participate in the development of a regional stormwater management plan under the proposed New Jersey Stormwater Management Rules. The stormwater models developed for this study can support of the development of a watershed-wide, regional stormwater management plan.