Municipal Spray Irrigation on Non-Ag Land

Background: Many municipal wastewater treatment plants have permits to discharge effluent directly to nearby waters only during certain months of the year. For the remainder of the year (most typically the growing season), these plants discharge their effluent to nearby herbaceous lands (including golf courses, turf grasses and other non-agricultural herbaceous areas), thereby removing the direct discharge pathway to nearby waters. These discharges are most often made to grassy areas to take advantage of the natural nutrient uptake and retention ability of grasses, thus reducing, but not altogether eliminating nutrient runoff to nearby waters. The Chesapeake Bay Program's Phase 5.3.2 Watershed Model did not explicitly simulate municipal spray irrigation on non-ag land as a source of nutrients to the watershed. This memo recommends a way to explicitly simulate this nutrient source as part of the Phase 6 Watershed Model.

Data Collection: In order to simulate this source, all jurisdictions would need to collect spray irrigation records from 1985 through 2015 or estimate spray irrigation based on more recent records. Only wastewater sprayed on non-agricultural herbaceous lands would be collected for this effort. These records would need to contain the following:

- Location of irrigation activity: Latitude/Longitude
- Amount of irrigation: Total liters or gallons per year
- Concentration of nutrients: Average concentration per liter or gallon irrigated
- Estimated nutrient uptake and retention by herbaceous area: Total lbs of nutrient retained via uptake and soil retention; note that if a jurisdiction does not have estimates of uptake and retention, the Wastewater Workgroup will define a default uptake and retention rate based upon other jurisdictions' data and/or literature information.

This data would need to be collected and reported to the Chesapeake Bay Program by July 31, 2015 and revised if needed by April 1, 2016 in order to be included and simulated in the Phase 6 Watershed Model. Jurisdictions would be asked to submit data in future years for future model runs.

Equation: The Phase 6 Watershed Model will use a simple nutrient balance simulation to estimate the loads from spray irrigation at each location. The following equation will be used:

Yearly Spray Irrigation Nitrogen Load to Nearby Stream =(Total G of Spray Irrigation X Average Lb/G Nitrogen) – (Total Lbs Nitrogen Uptake + Total Lbs Nitrogen Soil Retention)

The resulting load will be simulated as a discharge to the modeled stream similar to the discharge from a septic, and will be subject to further retention within the stream during simulated transport to the Chesapeake Bay.

Model Load Results: The resulting discharge to the simulated stream will be reported by the Chesapeake Bay Program models as a municipal wastewater discharge to the land, or "MWL."

Municipal Spray Irrigation to Agricultural Lands

Background: Many municipal wastewater treatment plants have permits to discharge effluent directly to nearby waters only during certain months of the year. For the remainder of the year (most typically the growing season), these plants discharge their effluent to nearby agricultural crop lands thereby removing the direct discharge pathway to nearby waters. These discharges take advantage of the natural nutrient uptake and retention ability of crops, thus reducing, but not altogether eliminating nutrient runoff to nearby waters. The Chesapeake Bay Program's Phase 5.3.2 Watershed Model did not explicitly simulate municipal spray irrigation on agricultural lands as a source of nutrients to the watershed. This memo recommends a way to explicitly simulate this nutrient source as part of the Phase 6 Watershed Model.

Data Collection: In order to simulate this source, all jurisdictions would need to collect spray irrigation records from 1985 through 2015 or estimate spray irrigation based on more recent records. Only wastewater sprayed on agricultural lands would be collected for this effort. These records would need to contain the following:

- Location of irrigation activity: County
- Amount of irrigation: Total liters or gallons per year
- Concentration of nutrients: Average concentration per liter or gallon irrigated

This data would need to be collected and reported to the Chesapeake Bay Program by July 31, 2015 and revised if needed by April 1, 2016 in order to be included and simulated in the Phase 6 Watershed Model. Jurisdictions would be asked to submit data in future years for future model runs.

Simulating Uptake and Retention: Jurisdictions will not be asked to provide estimates of uptake of nutrients by crops or nutrient retention within the landscape. The Phase 6 Watershed Model will directly estimate nutrient uptake and nitrogen retention and delivery from all agricultural lands. These estimates will be dynamic and will vary by year and location across the watershed. Any nutrients that are not taken up by plants or otherwise retained within the landscape will be simulated as non-point source discharges to the modeled stream similar to the discharge from a septic, and will be subject to further retention within the stream during simulated transport to the Chesapeake Bay. The Chesapeake Bay Program will assume that municipal wastewater was sprayed on commodity row crops within the county reported that were eligible to receive manure.

Model Load Results: The resulting simulated nutrient loads to nearby waters and the Chesapeake Bay will not be reported under any specific category, but will instead be one small part of the nutrient loads reported from commodity row crops.

Rapid Infiltration Basins

Background: A small number of municipal wastewater treatment facilities across the watershed discharge wastewater to permeable earthen basins designed to provide nutrient treatment of wastewater through soil infiltration rather than discharging wastewater directly to a nearby stream. The Chesapeake Bay Program's Phase 5.3.2 Watershed Model did not explicitly simulate rapid infiltration basin discharges as a nutrient source. This memo recommends a way to explicitly simulate this nutrient source as part of the Phase 6 Watershed Model.

Data Collection: In order to simulate this source, all jurisdictions would need to collect rapid infiltration records from 1985 through 2015 or estimate past data based on more recent records. These records would need to contain the following:

- Location of basin: Latitude/Longitude
- Amount of wastewater: Total liters or gallons per year
- Concentration of nutrients: Average concentration per liter or gallon discharged
- Estimated retention by rapid infiltration basin: Total lbs of nutrient retained within the basin; note that if a jurisdiction does not have estimates of retention, the Wastewater Workgroup will define a default retention rate based upon other jurisdictions' data and/or literature information.

This data would need to be collected and reported to the Chesapeake Bay Program by July 31, 2015 and revised if needed by April 1, 2016 in order to be included and simulated in the Phase 6 Watershed Model. Jurisdictions would be asked to submit data in future years for future model runs.

Equation: The Phase 6 Watershed Model will use a simple nutrient balance simulation to estimate the loads from rapid infiltration basins at each location. The following equation will be used:

Yearly RIB Nitrogen Load to Nearby Stream = (Total G of RIB X Average Lb/G Nitrogen) – (Total Lbs Nitrogen Removal by RIB)

The resulting load will be simulated as a discharge to the modeled stream similar to the discharge from septic, and will be subject to further retention within the stream during simulated transport to the Chesapeake Bay.

Model Load Results: The resulting discharge to the simulated stream will be reported by the Chesapeake Bay Program models as a municipal wastewater discharge to the land, or "MWL."