

Florida Avenue and Dixie Lane Swale Project: Load Removal Estimation for Rock-35

The Florida Avenue and Dixie Lane Swale is a grass swale with swale blocks or raised culverts that is 200 feet in length, 12 feet in width, and has a retention of 12 inches. The swale itself is 0.05 acres in total, but will treat an area of about 9.49 acres. Swales are designed to infiltrate a defined quantity of runoff (the treatment volume) through the permeable soils of the swale floor and side slopes into the shallow ground water aquifer immediately following a storm event. A swale with swale blocks or raised driveway culverts essentially is a linear retention system in which the treatment volume is retained within the swale by designing periodic linear flow barriers (blocks and culverts) and the water is retained to promote percolation.

To accurately predict baseloads for the treated drainage area, the PLSM model was run with custom inputs for the City of Rockledge (land use, treatment areas, average local rainfall, all previously approved by the FDEP) for the treatment basin.

Table 1 provides the specific input volumes (in m³/year) and nutrient loads (in lbs/year) predicted to be treated by this BMP. A total of 134.66 lbs. of TN and 32.33 lbs. of TP were baseload for the basin based on the updated PLSM run. Applying the formula for a grass swale with swale blocks or raised culverts provided by DEP evaluation/regression of Harper and Baker 2007, the percentage removal for the BMP for each TN and TP was greater than 100% removal, so 100% removal was applied for both TN and TP removal efficiency. The values of removal data are presented below:

- 134.66 pounds removed of TN annually
- 32.33 pounds removed of TP annually

Table 1 includes both input and output loads for the Florida Avenue and Dixie Lane Swale Project BMP for your reference. The Grass swales with swale blocks or raised culverts formula (on-line retention formula) for both TN and TP was $0.3178 * \ln(x) + 0.7405$ (where x is equal to the inches of retention). This swale has a total of 12" of retention, used in the formula above and Table 1.

Table 1. Input values and loads for the Florida Avenue and Dixie Lane Swale (Rock-35) and estimate load removals based on on-line retention removal efficiencies.

Basin	Description	Area (in acres)	Input Data			Nutrient Load Removal				Comments
			Total Volume (m3/year)	TN (lbs/yr)	TP (lbs/yr)	TN/TP Reduction Formula	Reduction Efficiency (%)	TN Load Reduction (lbs/yr)	TP Load Reduction (lbs/yr)	
1A_1P_Sub	ROCK-35 Treatment Basin	9.49	34,656.35	134.66	32.33	30%-74% (formula: $0.3178 * \ln(x) + 0.7405$; where x = inches of retention)	153.02%	134.66	32.33	Based on Project Type "Grass swales with swale blocks or raised culverts", which used the "On-line Retention Formula" (Harper and Baker 2007) based on 12" of provided retention. The calculated reduction efficiency for this BMP is 153%. Since this value exceeds 100%, a 100% reduction was applied.