Portage and Arcadia Creeks Watershed Transition/Implementation
Project Tracking Code: 2003-0028

Tables 1-1 to 1-3. 2002 Baseline Subwatershed Loading *(Task 1.1.3)*

Nonpoint source loads were calculated for the contributing areas of each subwatershed (areas defined by topography and surface water connections) during the Version I Watershed Management Planning Project based on 1997 land cover and soils characteristics (See http://www.kalamazooriver.net/pa319new/emc.htm). During the early stages of the Transition Grant, high and medium priority streambank erosion sites were revisited. Sediment loading from sites of streambank erosion was quantified based on the geometry of the site, the soil type and an estimated severity of erosion. Additional details on these streambank loads are included in Table 3-1 (Attachment 3). Those streambank loads were added to the empirically-estimated runoff loads calculated in during the Version I Watershed Management Plan and displayed in the last column of Tables 1 and 2. (Streambank loads include parking lot runoff from a site adjacent to Portage Creek because runoff from this parking lot has been observed to cause streambank and adjacent lawn area erosion.) TSS and TP loads are shown in Table 1-1 and Table 1-2, respectively. Estimated loads are compared to loads calculated with ISCO auto-sampler data collected from the mouths of Portage and Arcadia Creeks during the 2002 Planning Project. (See http://www.kalamazooriver.net/pa319new/loading.htm.)

Storm sewer drainage units in the City of Kalamazoo were mapped during the 2002 project based on available maps. Loads were calculated for each drainage unit based on land cover and soil types. The city completed a storm sewer asset inventory and provided new storm sewer maps to the project team. The storm sewer drainage units were remapped based on the new data. The differences in land area of the old drainage units compared to the new drainage units were calculated. The previously modeled loads for each drainage unit were adjusted by the change (as a percentage of the old drainage area) in land area of each unit. Attachment 3 contains detailed runoff and loading details for storm sewer drainage units. The "Storm Sewer Drainage Unit " column in each of the tables below identifies the runoff and loading directly piped to the creeks by storm sewers. The percent of this volume or load in relation to the total contributing area value is also reported. Table 1-3, below, lists modeled annual storm water runoff from the contributing areas of each watershed and from the mapped storm sewer drainage units.

Table 1-1. Total Suspended Solids Loads from Storm Water Runoff and Streambank Loads (tons/year)

Subwatershed	**Storm Sewer Drainage Unit Loads (subset of contributing watershed load) (tons/year)**	**Modeled Contributing Watershed Runoff Loads (tons/year)**	**Eroding Streambank Loads (tons/year)**	**Total Current Load (Contributing Watershed Runoff + Streambanks) (tons/year) Columns 3 + 4.**
Arcadia	267 40% of contributing load	660	268	928 ISCO wet weather: 700, dry weather: 12.6
Axtell	83 90% of contributing load	92	48	140
Portage	365 (lower) 22% of contributing load	1,673	204	1,877
West Fork	40 (lower) 4% of contributing load	936	8.5	945
Total Portage Creek (Axtell, Portage, West Fork)		2,701	258	sum of above: 2,962 ISCO wet weather: 1610 dry weather: 475

Table 1-2. Total Phosphorus Loads from Storm Water Runoff and Streambank Loads (pounds/year)

Subwatershed	**Storm Sewer Drainage Unit Loads (subset of contributing watershed load) (pounds/year)**	**Modeled Contributing Watershed Runoff Loads (pounds/year)**	**Eroding Streambank Loads (pounds/ year)**	**Total Current Load (Contributing Watershed Runoff + Streambanks) (pounds/year) Columns 3+4.**
Arcadia	1,817 44% of contributing load	4,117	273	4,390 ISCO wet weather: 2,387 dry weather: 380
Axtell	538 90% of contributing load	598	50	648
Portage	2,512 (lower) 29% of contributing load	8,771	210	8,981
West Fork	256 (lower) 5% of contributing load	5,432	9	5,441
Total Portage Creek (Axtell, Portage, West Fork)	3306 (lower) 22% of contributing load	14,751	2687	sum of above: 15,000 ISCO wet weather: 8,473 dry weather: 3,940

Table 1-3. Modeled Storm Water Runoff Volume (acre-feet/year)

Subwatershed	Modeled Runoff Contributing Watershed (acre-feet/year)	Storm Sewer Drainage Unit Volumes (subset of contributing watershed loading) (acre-feet/year)
Arcadia	5,842	2,362 40% of contributing volume
Axtell	914	815 89% of contributing volume
Portage	14,943	3,346 (lower) 22% of contributing volume
West Fork	8,535	552 (lower) 6% of contributing volume

The comparisons of runoff volumes and loading from the storm sewer drainage units to the contributing watersheds indicate that the Axtell Creek Watershed is heavily storm sewered with no municipal requirements for retention/detention. Ninety percent of the modeled storm water runoff and loading in this watershed is generated from storm sewers areas. In contrast, only 40% of the Arcadia Creek Watershed is estimated to be piped directly to the creek. The remaining areas discharge to other off-line ponds or are not storm sewered. In the Portage Creek Watershed, much of the drainage falls in the City of Portage, where storm water retention/detention is required for new developments. The majority of the watershed in the City of Kalamazoo is directly piped to the creek. Some areas were identified as not sewered, or as discharging to disconnected areas, such as the former Bryant Mill Pond.

The comparisons of total modeled loads (contributing area runoff plus streambank loads) with annual loads measured with the ISCO auto-samplers indicate that 60-80% (depending on watershed and pollutant) of the estimated loading was realized at the mouth of the creek. This is expected because each creek contains in-line ponds, which slow flows and retain sediments. This results in a portion of the sediments and associated TSS and TP loading to settle out of the water column. Additionally, the modeling does not account for in-stream transport. An additional factor is the seasonality, which affect loading for the year sampled (2002).