3.3.3 Channel Geometry

Sugar Creek was evaluated in plan, cross section, and profile.

Plan Form

Evaluating the shape of the watershed in plan form provides insight on whether and how parts of the basin differ from one another. For example, sub-basins with stronger soils, higher density of tributaries and storm pipes, or more severe degrees of channel manipulation may require different management approaches than the remaining sub-basins.

Figure 3**.3.17** depicts stable and developing meanders in the project reach. The upper reaches are steep and straight. The process is so dominated by incision that there is little unconsolidated material available to build bars and initiate plan form adjustments. The first concentrated influx of sediment at the Brown's Canal confluence corresponds to the onset of depositional features. Downstream of Brown's Canal, the main stem has a series of meanders that fall well outside the range of stable curves for alluvial streams as described in Section 1. The meanders are too flat for efficient energy management and some degree of sand bar formation directing and concentrating the flow against the opposite banks to increase the amplitude of the curves is indicated. However, the sand bars in this reach are only moderately consolidated and appear too mobile to consistently focus scouring energy under frequent flow conditions. The vulnerability for this reach is under low frequency, high intensity storms where the stream will have sufficient power to increase the amplitude of the meander bends. Bank retreat will likely be episodic, a rare but severe event.

Despite the obvious channelization, the reach below Baytree Road has a largely stable plan form. Outside of the heavily armored areas, the channel has reacquired a sinuous plan form and most of the meanders have or are approaching a stable shape. The few logjams and failing slopes are the result of the downstream extension of the meander limb. Once this curve reaches and equilibrium shape, the adjustment will abate as long as hydrology is not altered further.

Cross Section

The cross sectional shape of a stream channel indicates the stage of channel evolution. When integrated with plan and profile indicators such as bar building or knick points, cross section data are used to determine the dominant channel process. No one data set is adequate to diagnose channel process, the foundation of stream management, but analyzed in the aggregate, it is possible to build a defensible case. **Figure 3.3.18**, developed with data from the SWWM model, illustrates the point.