3.13 Sharpers Run – Subwatershed Condition

3.13.1 Subwatershed Characteristics

The Sharpers Run **subwatershed** is the smallest of all the subwatersheds in the Difficult Run watershed. It has an area of approximately 415 **acres** (0.65 mi^2). Towlston Road lies along the subwatershed's western boundary, while Leesburg Pike (Virginia 7) forms the approximate southern boundary. The Georgetown Pike (Virginia 193) forms the approximate northern boundary.

The Sharpers Run subwatershed is located in the downstream portion of the Difficult Run watershed. There is a single stream **channel** in Sharpers Run. The stream is approximately 1.6 miles in length and flows in a northerly direction until it joins Rocky Run and eventually the mainstem of Difficult Run.

Refer to DFSP_1 for a map of the Sharpers Run subwatershed highlighting the Subwatershed Characteristics including, existing **land use**, **flood limit**, **wetlands**, **resource protection areas** and **stormwater management**.

3.13.2 Existing and Future Land Use

The type and density of land use in a subwatershed can affect the downstream water quality and stream condition. While each land use type introduces issues to the natural stream system, more intense land use types, such as high-density residential, commercial and industrial, can have high levels of **impervious** surface and contribute **runoff** and **pollutants** to the stream system. Less intense types such as open space and estate residential are generally less impervious, have more natural vegetation and therefore have less impact on stream quality.

The Sharpers Run subwatershed is currently one of the most undeveloped areas in the Difficult Run watershed. Sixty-four percent of the Sharpers Run subwatershed is developed as low-density or estate residential. Another 24 percent is open space or parks, although there are no major parks found within the subwatershed boundary. One historical site lies within the subwatershed. There are no commercial uses in the subwatershed; however 8 percent is used for industrial purposes. Much of this activity is located at the southern boundary of the subwatershed near Woodside Lake, and the intersection of the Leesburg Pike (Virginia 7) and Towlston Road. There are 15 acres, or 4 percent of the subwatershed, occupied by transportation use such as roads and highways.

Total **impervious** area for the subwatershed, which includes all roads, parking lots, residential driveways and buildings, is approximately 39 acres, or 9 percent of the total subwatershed area. A summary of land use within the subwatershed can be found in Table 3.21.

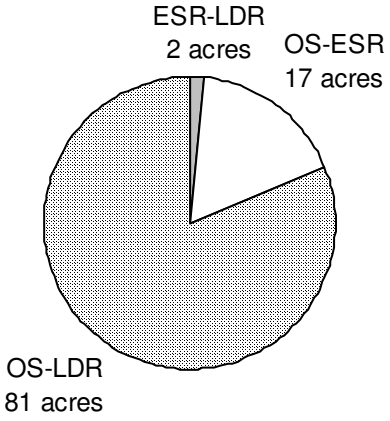
Table 3.21 Existing and Future Land Use

Land Use Type	Existing		Future		Change	
	Acres	Percent	Acres	Percent	Acres	Percent
Open space, parks, and recreational areas	98	24%	0	0%	-98	-24%
Golf Course	0	0%	0	0%	0	0%
Estate residential	155	37%	171	41%	15	4%
Low-density residential	112	27%	195	47%	83	20%
Medium-density residential	0	0%	0	0%	0	0%
High-density residential	0	0%	0	0%	0	0%
Low-intensity commercial	1	0%	1	0%	0	0%
High-intensity commercial	0	0%	0	0%	0	0%
Industrial	34	8%	34	8%	0	0%
Institutional	0	0%	0	0%	0	0%
Transportation	15	4%	15	4%	0	0%
Water	0	0%	0	0%	0	0%
Total	**415**	**100%**	**415**	**100%**		**0%**

Changes in the land use that result in higher intensity uses in the future can present problems for streams. For example, if the land use shifts from open space to high-intensity commercial use, additional buildings, roadways and parking lots may replace the forest and open fields and impact stream condition.

The notable changes between existing land use and future land use in Sharpers Run are projected in the open space, estate and low-density residential categories. There is projected to be a 24 percent loss in the open space category, with compensatory increases in the estate residential category and low-density residential categories (4 percent and 20 percent respectively).

Figure 3.16: Changed Land Use



According to Figure 3.16, 81 acres are projected to shift from open space to low-density residential and 17 acres are projected to shift from open space to estate residential. This does not guarantee that the open space will become developed – it suggests that these areas of open space can be used for development/ redevelopment in the future. There is the possibility that Sharpers Run could lose much of its open space to development, which may result in increased levels of **impervious** surface and contribute **runoff** to the stream system. These shifts illustrate a demand for additional housing in the future.

3.13.3 Existing Stormwater Management

Stormwater management provides treatment of otherwise uncontrolled runoff to reduce the harmful effects of increased stormwater flows and stormwater runoff pollution. County records indicate that there are only two stormwater management facilities within the Sharpers Run subwatershed. Ninety percent of the Sharpers Run subwatershed is not served by any stormwater management facility resulting in uncontrolled volumes of water and pollutants. Eight percent of the total area has quantity control only and the remaining two percent receives both **quantity and quality control**.

The difference between the amount of total developed area in the subwatershed (76 percent) and the area served by stormwater management (10 percent) indicates a potential for stream impairment due to uncontrolled stormwater and indicates a possible need for additional management efforts, specifically in the industrial and low-density residential areas. Additional information on the location of the stormwater management facilities in the Sharpers Run subwatershed is found in Appendix D.

Outfalls

The storm drainage system connects the developed portions of the land to the stream system. Stormwater outfalls are located where the stormwater system ends and the natural channel begins. Outfalls may be sources of pollutants and excessive stormflow from pipes can cause erosion at the outfall and downstream. During the Stream Physical Assessment field crews did not locate any **outfall** pipes discharging into Sharpers Run subwatershed.

Stream Crossings

Stream crossings, such as bridges and culverts are often locations of erosion and flooding. The combination of aging structures and frequently high stormwater levels can cause downstream stream stability problems and habitat impairment. There were four crossings in the Sharpers Run subwatershed identified during the Stream Physical Assessment. Two of the crossings were circular corrugated metal pipes, and two were wooden bridges (one was a footbridge). None of the crossings were having an impact on the stream condition.

3.13.4 Soils

Soils found in the Sharpers Run subwatershed belong primarily to the Glenelg – Elioak – Manor association. This association consists of rolling and hilly landscapes, which can generate rapid **runoff**, and **micaceous** soils, which are erodible. The **groundwater** is fairly shallow with numerous natural springs. The subwatershed contains 84 percent of the B hydrologic soil group with Glenelg silt loam being the dominant soil type (41percent). B soils and the Glenelg soil type are compatible with **infiltration** practices and may provide potential stormwater management sites. There are 5.3 acres of land with unclassified soils in the Sharpers Run subwatershed. Soils that cover at least 20 acres within the subwatershed are listed in Appendix A.

3.13.5 Geomorphology

There are approximately 1.6 miles (8,218 feet) of stream in the Sharpers Run subwatershed that were assessed and assigned a **Channel Evolution Model** classification as part of the *Stream Physical Assessment*. The classification indicates the stream channel's physical condition and stability as a response to disturbances such as upstream land use changes.

All of the streams were classified as Type III, which is indicative of a generally unstable channel that is actively widening in response to changes in flow. All of the streams are

considered moderately unstable with high erosion potential during flood events. The dominant substrate material was sand. In approximately half of the length, there was a combination of sand and gravel. Refer to DFSP_3 for the stream classifications.

There were three specific erosion points totaling 65 feet that were noted in the subwatershed. All were creating a severe impact on the stream condition and had moderate restoration potential.

There was one stream blockage made up of trees and debris that appeared to be restricting fish movement. The obstruction also has the potential to create **flooding** problems under high flow conditions. The obstruction is shown in Photo 3.35 and is a candidate site for restoration S90.

Photo 3.34 Eroding bank located east of the Lawns of Towlston Community (DFSP002.E001)

Photo 3.35 Obstruction at the northern end of Sharpers Run near the confluence with Rocky Run between the Bryan Pond and Peacock Station communities (DFSP001.T001).

3.13.6 Stream Habitat and Water Quality

All stream reaches are of moderate to high slope and are generally characterized as having a predominance of **riffle** and **run** stream type. The stream reaches have the following stream habitat and water quality characteristics as taken from the Stream Physical Assessment, which provides a one-time visual inspection. Field crews conducted that assessment in the fall of 2002.

- All of the reaches have Fair habitat for aquatic insects and fish.
- There is 6,450 feet of **riparian buffer** encroachment (this length includes left and right banks combined). Of this total, 5,650 feet (88 percent) is impacted by lawns, and 800 feet (12 percent) is bordered by meadow.
- Fifty-six percent of the buffer encroachment length is affecting the stream channel by reducing shading effects. One of the buffer encroachment sites is shown below in Photo 3.36. This site is a stream restoration candidate site S90.
- Seventy-one percent of the **buffer** encroachment length has a moderate restoration potential while 29 percent was identified only having low restoration potential.

- Seventy-eight percent of the assessed stream length had between 50 percent and 70 percent of both stream banks covered by vegetation. Typically this vegetation is scattered grasses, shrubs and forbs. Twenty-two percent of the assessed stream length had a variety of vegetation and covered 70 percent to 90 percent of the stream bank surface.

Photo 3.36 Buffer encroachment between Rocky Run Road and Cedrus Lane (DFSP001.B004).

3.13.7 Hydrology and Water Quality Modeling

The water quality and quantity were modeled for each subwatershed and **catchment** in the Difficult Run watershed to provide estimates that can be used for planning. The models used in Sharpers Run incorporate data on the amount, character and location of the land use, impervious cover, topography, vegetation, streams and stormwater management to generate estimates of water quality and quantity in the streams. Water quality modeling includes **pollutant loading** estimates for total **nitrogen** (TN), total **phosphorus** (TP) and total **suspended solids** (TSS). Because changes in land use effect the amount of runoff, streamflow, the quantity modeling estimates the amount of runoff generated by the land during rainfall and the peak streamflow or **discharge** that results.

Modeling of future conditions generally uses the same data inputs and estimates the same parameters but does so with future land use information. The future land use is a prediction of how land use would change based on the current zoning designations and the Comprehensive Plan. The difference between the existing and future model results identifies areas that will need additional management measures.

Sharpers Run subwatershed is comprised almost entirely of estate and low-density residential and open space land uses. The one exception is a large industrial area, at the intersection of Towlston Road and Leesburg Pike, in **catchment** DFSP9901. This area likely contributes a large percentage of the stormwater subwatershed. Refer to DFSP_4 for the catchment locations. Most all **pollutants** in this subwatershed come from runoff. The catchment with the most runoff volume is DFSP0002, located between Towlston Road and Union Church Road. There is more low-density land use in this catchment than estate residential, so the runoff volume is higher than DFSP0001, where estate residential area is greater than low-density residential area. Results can be seen in Table 3.22.

Table 3.22 Existing and Future Modeling

Sharpers Run Catchments		Runoff Volume (in/yr)	Peak (cfs/ac)	TSS (lb/ac/yr)	Runoff TN (lb/ac/yr)	Runoff TP (lb/ac/yr)
DFSP0001	E	1.7	0.13	13.8	0.7	0.2
	F	1.75	0.13	14.0	0.7	0.2
	C	3%	0%	1%	0%	0%
DFSP0002	E	1.95	0.12	15.8	0.9	0.2
	F	1.95	0.12	15.8	0.9	0.2
	C	0%	0%	0%	0%	0%
DFSP9901	E	1.63	0.08	28.5	1.6	0.2
	F	2.63	0.07	46.2	2.4	0.3
	C	61%	-13%	62%	50%	50%

E – Existing conditions results, F – Future conditions results, C – Change between existing and future shown as a percentage of the existing condition. Value is based on unrounded figures

The future model shows minor or negligible increases in all parameters for all catchments except DFSP9901. All of the open space in this catchment is projected to change to low-density residential in the future. This change in surrounding cover will likely increase the pollutants and runoff volume delivered to the stream.

3.13.8 Hydraulic Modeling

Hydraulic modeling combines topography with information concerning the stream system, the stream crossings and culverts to estimate the depth and speed of flow within the stream for various storm events. The model results indicate where overtopping of culverts may occur. The flows at this site exceed the capacity of the culvert. These sites can present a hazard and are considered candidate sites for improvement, further study and possibly a project to replace or retrofit the culvert.

One culvert in the subwatershed was overtopped with existing flows, as shown in Table 3.23. Road crossings that experience overtopping are listed in Appendix F and it is anticipated that improvements will be pursued with VDOT independent of the watershed planning process.

Table 3.23 Culvert Hydraulic Modeling

Culvert	Crossing		Flood Year						
			100	50	25	10	5	2	1
80	Bellview Road	E	x	x	x	x	x		

E – Existing conditions results, x – indicates overtopping

Culvert #80 (Photo 3.37) overtopped for all events except the one and two-year. Bellview Road carries through traffic, so it is considered a primary road. This means that it must pass the 25-year event.

Photo 3.37 Sharpers Run mainstem at Bellview Road.

3.13.9 Candidate Sites for Improvements

Based on the review of the assessment data and modeling results, the most serious problem areas in the Sharpers Run subwatershed are listed below. Refer to DFSP_4 for site numbers and locations. (S - stream sites, C - catchment sites, D – unconstructed regional pond replacement sites, F – flooding sites, and P – preservation sites).

Streams

S90 The Stream Physical Assessment identified this site as having buffer and erosion problems along with active widening. There is also a stream blockage at this site (Photo 3.35, 3.36).

Hydrology and Water Quality

D20 (Catchment DFSP0001) This catchment has the below average runoff within the subwatershed. Site S90 is located within this catchment and all of Sharpers Run has active widening.

Flooding

F80 The culvert under Bellview Road, which is considered a primary road, overtops for 5-year and greater events. Primary roads must pass the 25-year event (Photo 3.37).

Preservation

No preservation sites were identified.

3.14 Sharpers Run - Subwatershed Plan Action

In the previous subwatershed condition section, information from stream assessments, monitoring studies, and watershed modeling was presented to identify the location and severity of watershed impairments. For the subwatershed action plan section that follows, the candidate sites for improvement are discussed in terms of the specific impairment, a description of the project, and the goal of the project. Table 3.24 below is a list of all projects proposed in this subwatershed.

Table 3.24 Recommendations for Sharpers Run

Project #	Project Type	Candidate Site
DF9020B	Drainage Retrofit	D-20
DF9290	Streambank Stabilization	S90

3.14.1 Regional Pond Alternative Projects

D20 (DFSP0001)

Site Investigation and Projects:

DF9020B (Drainage Retrofit) These distributed projects are designed to provide energy dissipation at outfalls where paved channels discharge into natural channels at high velocities. Possible energy dissipaters include riprap and plunge pools. This should reduce the sediment export and help prolong the life of local farm ponds.

3.14.2 Catchment Improvement Projects

No sites were identified.

3.14.3 Stream Restoration Projects

S90

Site Investigation and Projects*:* The site investigation showed moderately eroding streambanks and a non-forested area within the left riparian zone. The stream is located between two gravel residential driveways.

DF9290 (Streambank Stabilization/Buffer Restoration) The banks would be regraded and stabilized. The left riparian area would be planted with native trees and shrubs.

3.14.4 Preservation

No preservation candidate sites were identified for this subwatershed.